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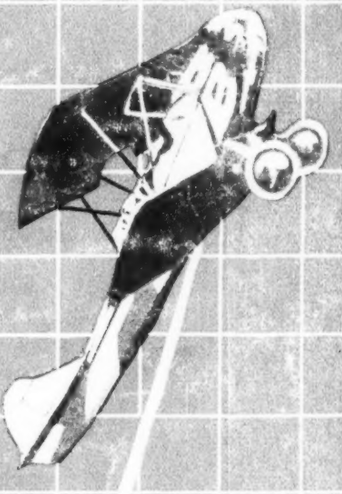
The Oldest American Aeronautical Magazine



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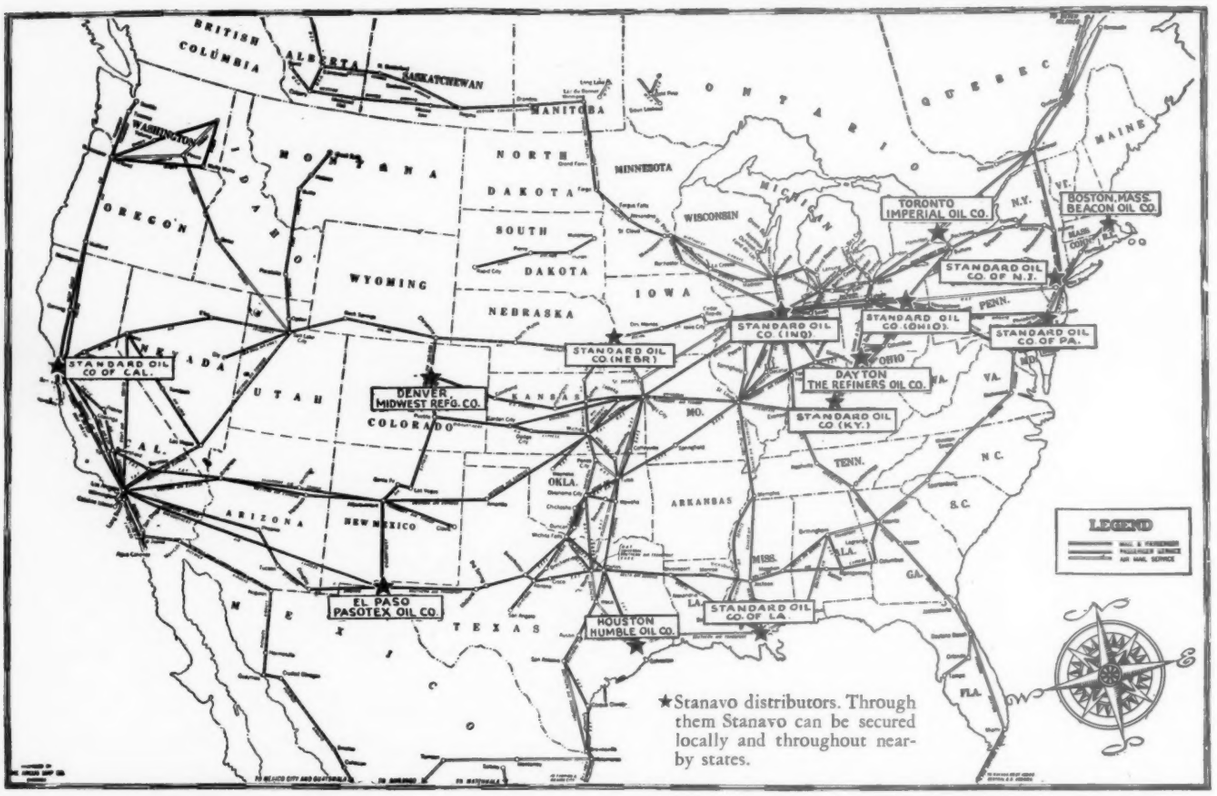

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AVIATION

The Oldest American Aeronautical Magazine

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Contents for March 22, 1930

VOLUME 28, NUMBER 12

Copyright, 1930, by McGraw-Hill Publishing Company, Inc.

Production and Licensing **558**

Materials **573**

U. S. Air Mail and Passenger Transportation **574**

Airports and Schools **582**

N.A.C.A., N.A.A. and Weather Bureau **587**

American and World Records **588**

Aeronautical Finance **590**

Canadian Aviation **592**

Exports **594**

Military and Naval Aeronautics **597**

Foreign Aviation **600**

Airplane and Engine Specifications **606**

INTRODUCTION TO STATISTICS.....557
GENERAL NEWS 614
AIRPORTS AND AIRLINES.....623
FOREIGN ACTIVITIES 627

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The Viking Amphibian and Flying Boat is the American interpretation of the Schreck F. B. A. . . . a plane that has a record of 6,000,000 miles without a structural accident . . . it is standard equipment in the French Navy—where it receives strenuous use in training pilots and with the fleet at sea.

Built in America by American capital, by American workmen and powered with an American engine . . . the Viking is unusual in design . . . the pusher type propeller forces the airstream directly onto the rudder and elevators giving more positive action on the controls . . . the Viking has a stability, maneuverability and performance which no flying boat in the same price range can equal.

Specifications of the Viking Amphibian and Flying Boat:

High Speed	102 M. P. H.	Duration	4¼ hours
Cruising	80 M. P. H.	Length	29 ft. 4 in.
Landing	40 M. P. H.	Height (on wheels)	11 ft. 3 in.
Climb (at Sea level)	600 ft. per min.	Span	42 ft. 3 in.
Service Ceiling	14,000 ft.	Wing Area	448 sq. ft.
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THE VIKING FLYING BOAT

Experienced pilots have tried to spin the Kittyhawk . . . most have failed . . . others have succeeded, but even they have been unable to hold it there for more than three or four turns . . . few planes can duplicate that performance.

With a landing speed of 38 miles per hour . . . a wheel tread of 7 ft. 2 in. . . . the Kittyhawk is particularly adept at getting in and out of small, rough fields.

Its high factor of safety . . . its performance . . . and low maintenance cost make the Kittyhawk an unusual plane for training and commercial use . . . and a plane that even the most critical and experienced pilots will be glad to fly.

Specifications of the Kittyhawk Model B-4:

Engine—Kinner K-5	100 h. p.	Weight empty	1107 lbs.
Approved Type Certificate No. 166		Useful load	768 lbs.
Length overall	22 ft. 11 in.	High speed	110 m. p. h.
Height overall	8 ft. 8 in.	Cruising speed	90 m. p. h.
Span both wings	28 ft.	Landing speed	38 m. p. h.
Chord both wings	4 ft. 6 in.	Climb	1200 ft. p. m.
Wing area	233.4 sq. ft.		

Also Approved Type Certificate as a Seaplane

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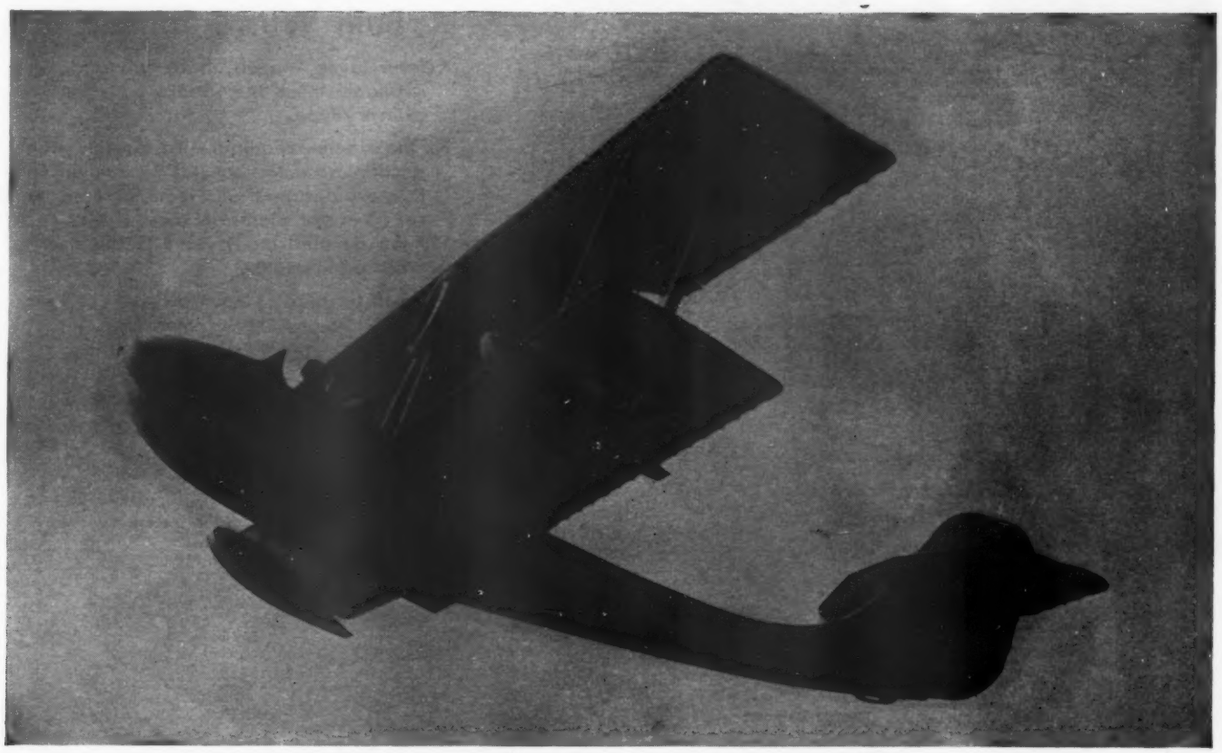
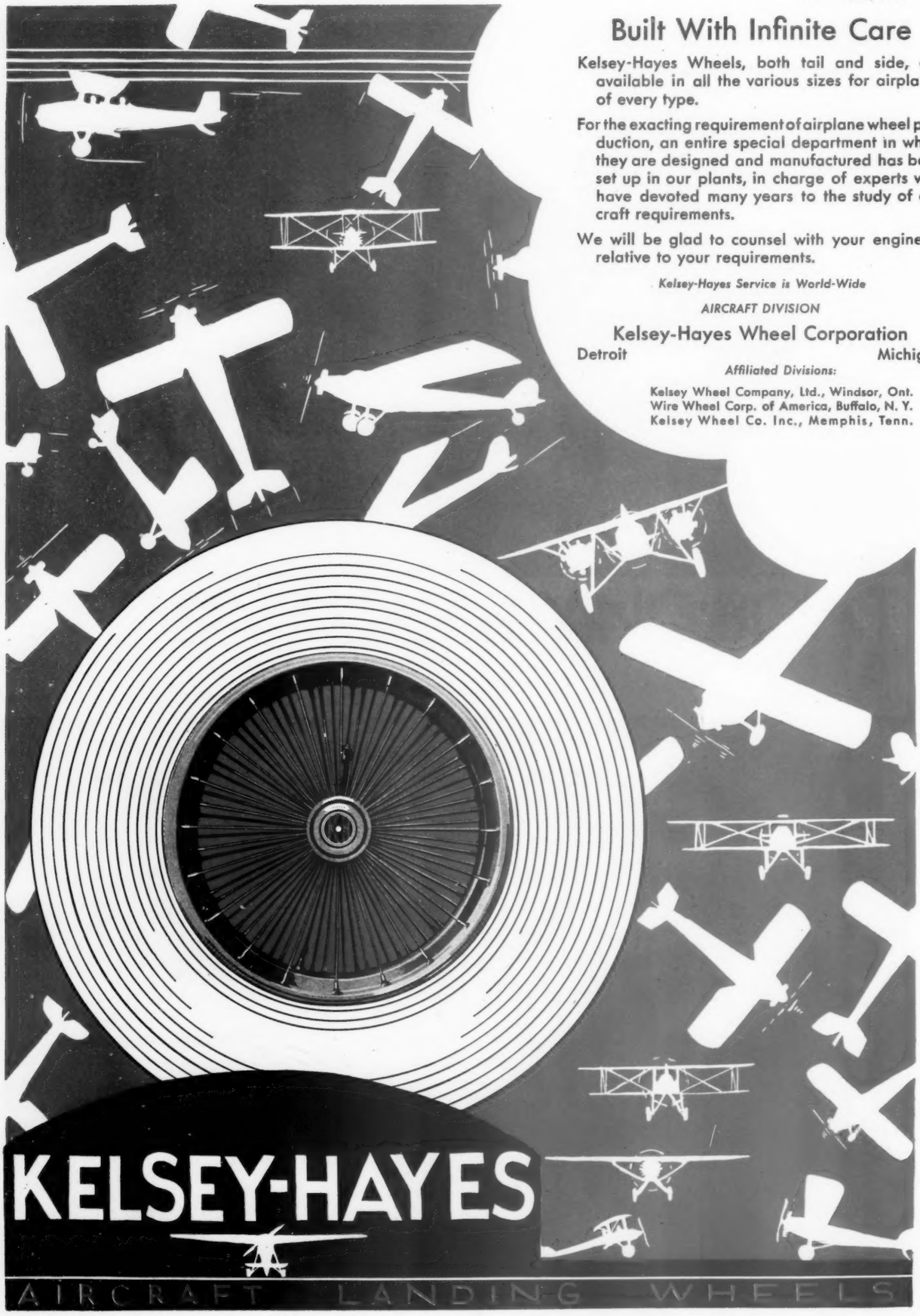
THE KITTYHAWK



An amphibian or flying boat of unusual design and performance. For further information and specifications of the Viking read the page opposite.

A three place plane combining safety and performance—but read the details about the Kittyhawk on the page to the left.



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Kelsey-Hayes Wheels, both tail and side, are available in all the various sizes for airplanes of every type.

For the exacting requirement of airplane wheel production, an entire special department in which they are designed and manufactured has been set up in our plants, in charge of experts who have devoted many years to the study of aircraft requirements.

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Sorry, but we must mention Lindbergh . . .

HE FLIES WITH CO-VE-CO!

BECAUSE it is the best, Lockheed selected Co-Ve-Co aircraft plywood for Col. Lindbergh's new low wing monoplane! . . . And why is Co-Ve-Co plywood superior? It is stronger. It is cut from logs just as they come from the forest, cold and unsteamed. Thus each square inch is uniform in quality for there are no bursted fibres. Co-Ve-Co aircraft plywood presents the most stubborn resistance to moisture absorption. It serves equally well under all climatic conditions. . . . You, too, should use Co-Ve-Co aircraft plywood. It can be precision manufactured to meet your specific needs, or it can be delivered in standard sheet sizes and thicknesses. Co-Ve-Co is manufactured both from Port Orford Cedar and Sitka Spruce. Communicate now with our sales representatives for details and samples.

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COMING EVENTS—

Will your City Fit Into The Air Transport Map of The Future?

Cities that built adequate airports several years ago are today reaping the benefits in airplane factories, air transport lines and other business attracted by modern air facilities. » » » Five years hence, many more cities will be marked as air transport terminals by reason of having provided the necessary airports. » » » If your town is considering an airport, it will pay you to avail yourself of our specialized knowledge and experience in every step of the project... from site selection to actual operation.

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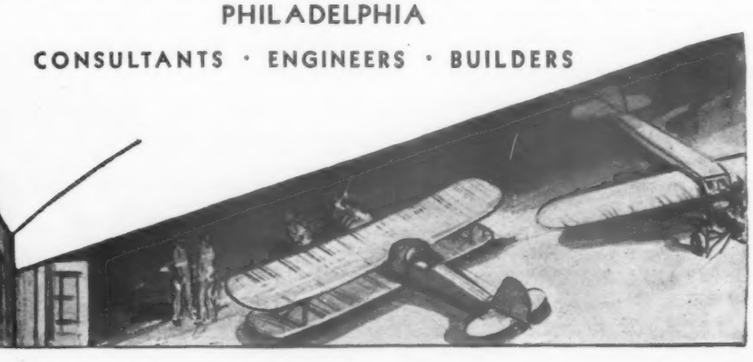
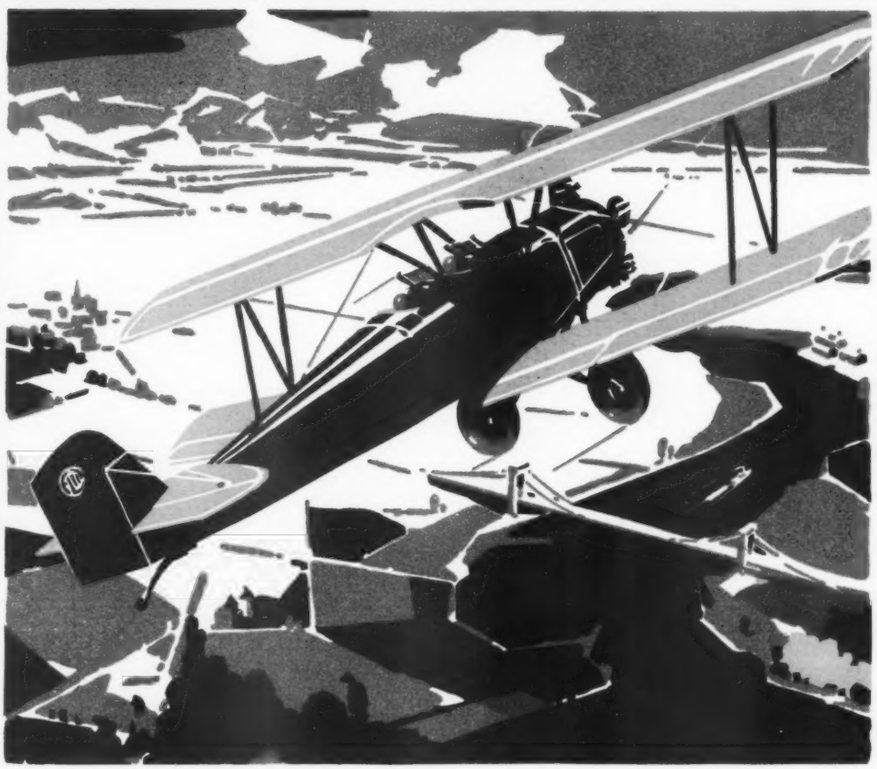
We would like to send you our booklet—
"BEFORE STARTING YOUR AVIATION DEVELOPMENT"
Write for it today . . . there is no obligation.



THROUGHOUT THE WESTERN HEMISPHERE



As a result of its popularity . . . The FLEET is rapidly becoming the standard training plane throughout the Western Hemisphere. The steadily increasing demand has extended distribution into all sections of the United States and Canada — and into Mexico, Central and South America as well. Aviation's wide acceptance of The FLEET as the plane for training and private use — combined with increased production facilities — has made possible a price reduction to $3,985 for The FLEET Landplane and $4,995 for The FLEET Seaplane equipped with the Kinner K5 — 100 H.P. engine — flyaway, Buffalo, N. Y. As standard equipment The FLEET will add prestige to any school . . . reduce air-hour costs, and thereby facilitate increased earnings.

FLEET AIRCRAFT INC · BUFFALO, N. Y.

THE FLEET

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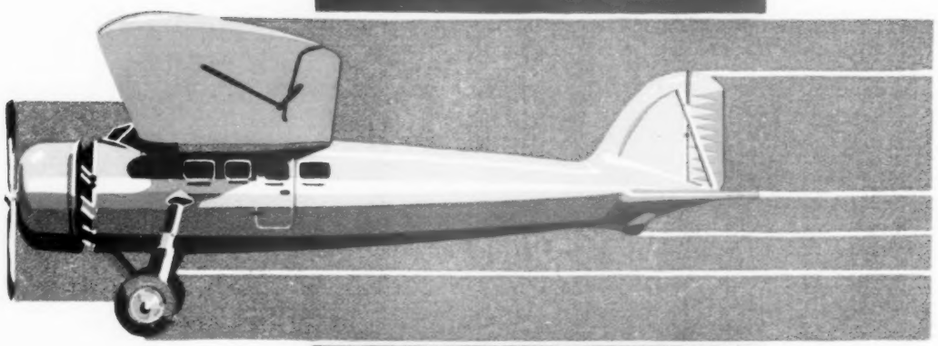
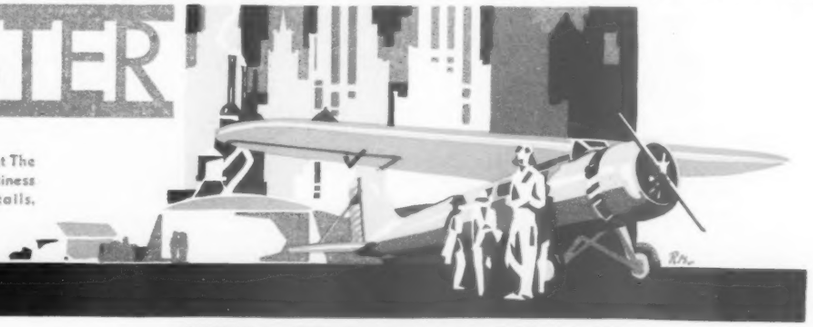


WITH A CRUISING SPEED OF 145 MILES AN HOUR

Designed primarily for transport service—The FLEETSTER is an all metal cabin monoplane with a useful load of 2000 pounds and a cruising speed of 145 miles an hour. It has sufficient fuel capacity to carry seven passengers comfortably a distance of 400 miles. With low air-maintenance cost that makes its payloads pay profit, The FLEETSTER should be of special interest to transport operators. For, payloads must be measured by traffic demands. To fly a multi-motored transport with only half a payload is unprofitable. In speed, economy, and the flexibility it lends to transport service, The FLEETSTER exceeds all expectations.

CONSOLIDATED AIRCRAFT CORPORATION · BUFFALO, N. Y.

THE FLEETSTER



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Here is a partial list of manufacturers using Stromberg Carburetors as standard equipment:

RECOGNITION

135 manufacturers use Stromberg carburetors as standard equipment. This impressive list, shown here, contains representative firms in every line of industry where motors are used.

These firms KNOW that Stromberg superior performance is the result of the highest type of carburetion engineering, the finest workmanship, the best materials procurable.

They recognize real merit and are willing to pay for it.

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Lycoming Motor
MacClatchie Manufacturing Co.
Menasco Motors, Inc.
Michigan Aero Engine Corp.
Navy Department
Pratt & Whitney Aircraft
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Warner Aircraft Corp.
Wright Aero Corp.

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Continental Motors Corp.
Dodge Bros. Corp.
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Jordan Motor Car Co.
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Windsor Corporation

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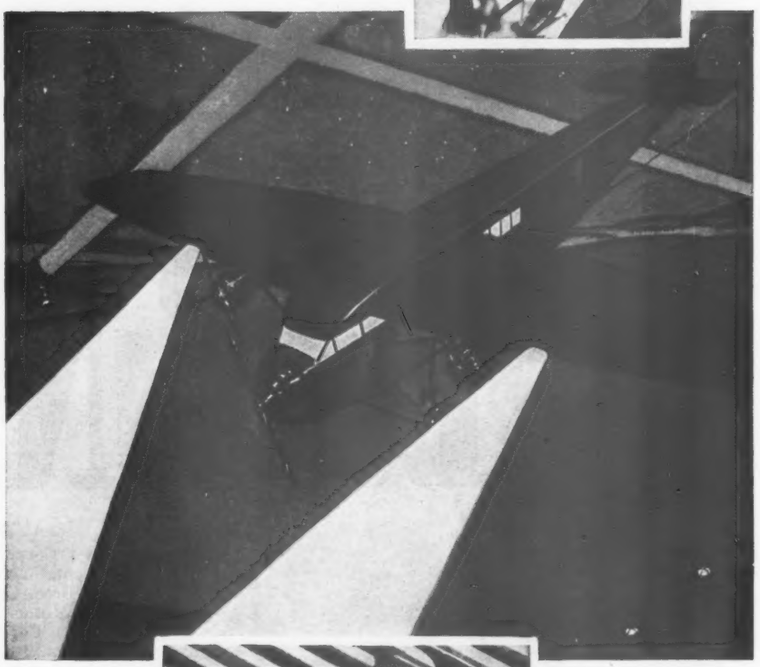
STROMBERG MOTOR DEVICES CO., 58-68 E. 25th Street, CHICAGO

Dependable Power.. *keeps* Communication *Active!*



Radio Efficiency Assured by Reliable Exide Aircraft Batteries

THROUGH clear skies or raging storms, great air liners depend upon radio equipment to keep them in constant communication with ground stations. To bring in reports on the weather ahead... accurate information on landing conditions at the next stopping point. That's why you find so many planes equipped with Exide Aircraft Batteries for steady, dependable radio power.

Millions of miles of trouble-free performance have proved the superiority of Exides in all kinds of flying service. And not only do Exide Aircraft Batteries assure efficient, economical power for radio, but also furnish steady, even current for landing lights . . . navigation and instrument lights . . . starting and ignition.

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Write NOW, for full information about Exide Aircraft Batteries, the many different types and their varied applications. This will prove valuable as well as interesting.

(Top) "HOW'S THE WEATHER OVER YOUR FIELD?" You can rely on your radio telephone equipment for perfect transmission and reception when Exides are on the job supplying dependable current.

✣

(Center) A SAFE NIGHT LANDING. Exide Aircraft Batteries keep landing lights bright . . . fill any plane's electrical requirements dependably and economically.

✣

(Left) EXIDE AIRCRAFT BATTERY is specially designed for hard flying service.

See Exide Booth
No. 8 Ingalls Airway
All American Aircraft Show
Detroit, April 5 to 13

Exide AIRCRAFT BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

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Exide Batteries of Canada, Limited, Toronto

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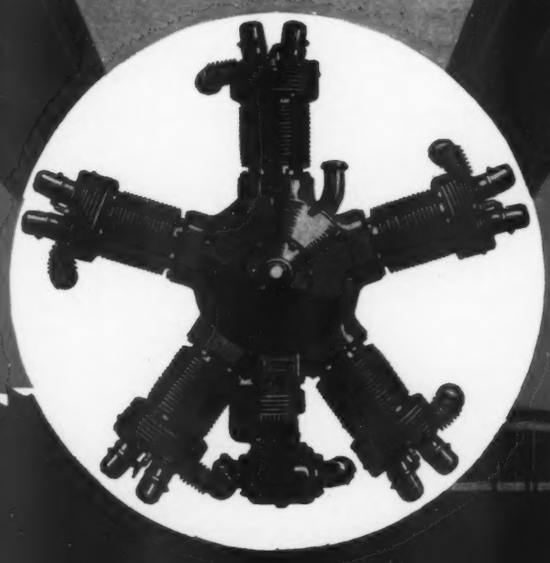
If replacement parts other than those manufactured by Kinner are installed in your motor, *then it is no longer a Kinner!* ◆ This warning is issued for the protection of the rapidly increasing number of pilots flying Kinner-powered planes! ◆ There is an Authorized Kinner Parts Dealer located on practically every major airport in the United States. Genuine Kinner Parts, manufactured to Kinner standards for quality, precision and balance, can only be secured from him. Kinner parts purchased from him assure the continued, dependable performance from your motor to which you are entitled. ◆ Write direct to this factory immediately and we will send you the name and address of your nearest Authorized Kinner Parts Dealer. When writing give your name and address, make of your plane and the number of your motor. You will then receive all bulletins, covering the care and operation of your motor, without charge.



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The next step in adapting Oxwelding to Aircraft Construction

A NEW PROBLEM faces the Aviation Industry. Expanding production programs demand a vast increase in welding operations. More welds must be completed—economically and with the same high quality and reliability.

A REAL SOLUTION is to be found in Linde Procedure Control. Throughout the industrial field it has solved the problem of adapting the oxy-acetylene process to the requirements of heavy production. The Aviation Service Division of The Linde Air Products Company serves the purpose of applying this tried and reliable method to the new requirements of the Aviation Industry.

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WITHOUT REBOUND -GRŪSS

WATCH THE WHEELS!

DO NOT blame the pilot if your ship comes galloping across the field like a small boy riding a stick . . . *look to the landing gear.*

Some planes jolt and joggle on the ground even though the field is not dangerously rough or rutty. But . . . any landing field, rough or smooth, is not a hazard to Gruss equipped ships.

The lightning-like action of Gruss struts absorbs the effect of ruts and bumps instantly. A Gruss equipped plane will land and taxi smoothly . . . the wheels follow the broken contour of the ground; the fuselage maintains an even keel.

Gruss retards depreciation. Gruss, without rebound, counteracts landing vibration with its air and oil action. In addition, Gruss struts now come to you as complete units, streamlined in our factory and shipped to you, with fittings, ready to install in your plane. By comparison, Gruss struts are pounds lighter. The price will interest you.

To lessen sales resistance, to guarantee complete owner satisfaction, *change to Gruss!*

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Standard Equipment with Good Operators—

PENNZOIL

"THE BEST MOTOR OIL IN THE WORLD"

It's significant that Pennzoil is the choice of America's good operators. Significant, too, that America's great passenger lines specify Pennzoil for every plane. If you have never used Pennzoil, you may wonder why. Here, then, are the facts:

Planes lubricated with ordinary oils require overhauling at intervals of 150 *to* 250 *hours. Planes lubricated with Pennzoil are regularly and safely flown* 300 *to* 400 *hours without overhauling. Most oils must be drained at* 15 *hours—Pennzoil at* 30 *to* 40 *hours. In other words, you get at least* 15 *extra hours of safe flying with every filling of Pennzoil.*

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The reasons for Pennzoil's superiority are obvious. It is made from 100% pure Pennsylvania crude—and nothing else. It is always uniform because it is refined *only* by the famous Pennzoil process in the refineries of the Pennzoil Company—largest organization in the world operating exclusively on Pennsylvania crude.

Make Pennzoil part of *your* standard equipment—it is the safest, most economical lubrication for any plane.

GUARANTEED BY THE PENNZOIL COMPANY 100% Pure Pennsylvania Oil of Supreme Quality

PERMIT NO. 2—PENNSYLVANIA GRADE CRUDE OIL ASS'N

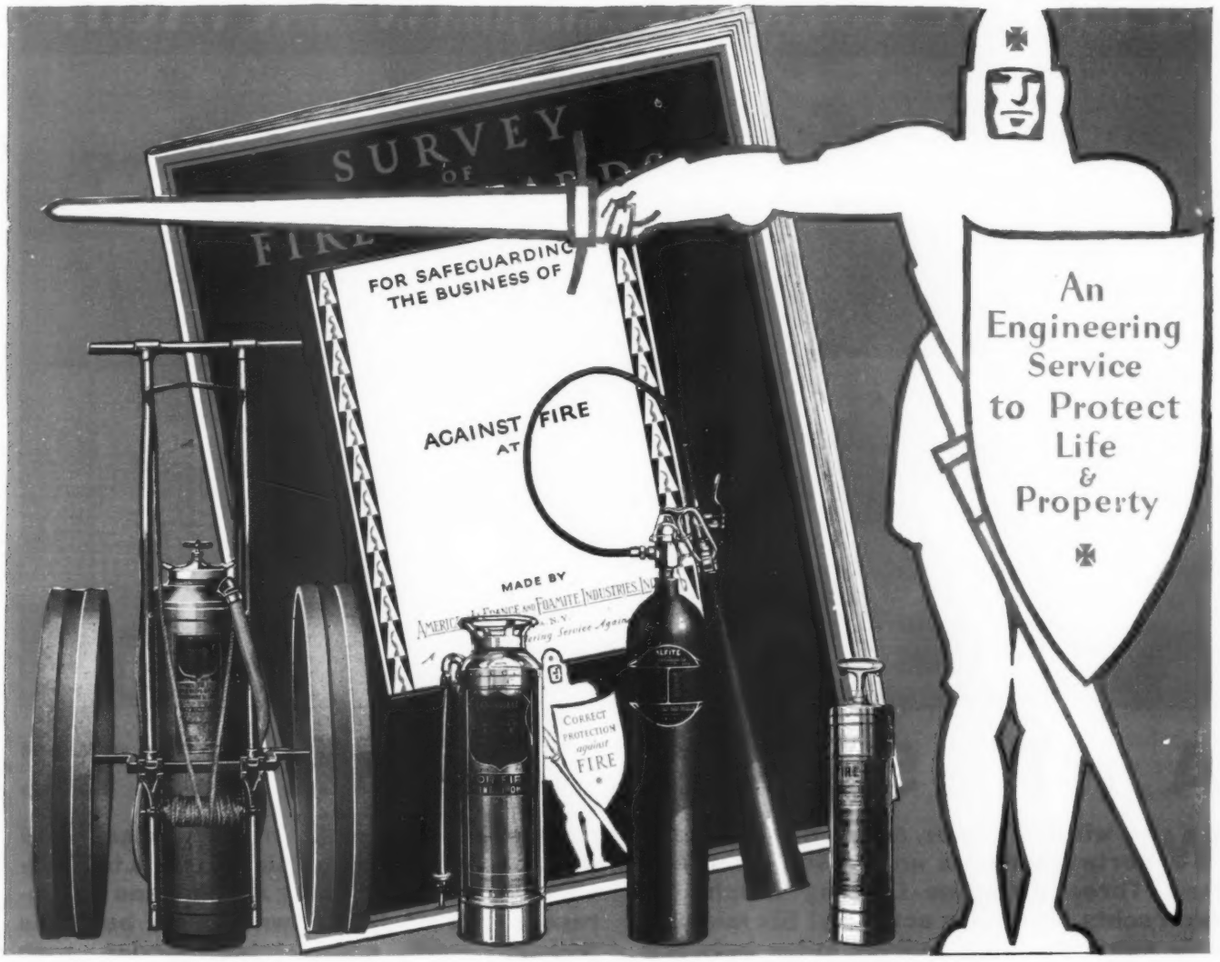
THE PENNZOIL COMPANY

Executive Offices and Refinery: Oil City, Pa.
Division Offices: New York, Chicago, Los Angeles

PENNZOIL

HIGHEST QUALITY PENNSYLVANIA OIL

FIRE — AN INCIDENT OR A DISASTER ?



Modern Safeguards Plus an Engineering Service for Airports

Physical conditions at airports vary. Type of buildings, layout, the size of the field, number of planes housed, patrolling or inspection of the field. Therefore, in order to protect any airport all these factors must be carefully studied and the protection that is adopted must be based on this study.

LaFrance and Foamite—already protecting over 150 of the leading airports—offers a complete engineering service for safeguarding airports against fire. This service includes:

A complete study by fire protection engineers. The supplying of proper and adequate safeguards. Instruction of your employees on the proper use of the equipment. Inspection and maintenance service—if you like—by our engineers to insure constant readiness of equipment for operation.

Whatever the condition at your airport, this service can protect it against fire. Write for one of our fire protection engineers to call or for a copy of "Sinister Beacons", a booklet covering airport hazards and our method of fire protection. American-LaFrance and Foamite Corporation, Dept. T60, Elmira, N.Y.

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KEYSTONE-LOENING AMPHIBIAN "AIR YACHT"

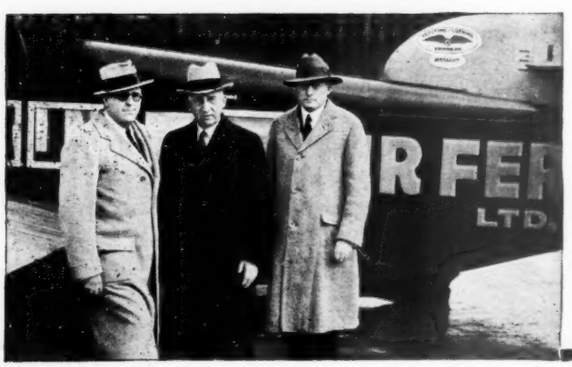
A PASSENGER A MINUTE

WITH winged power, a new day of transportation dawns on old San Francisco Bay. Three Keystone-Loening Amphibian Air Yachts herald its actuality! Six minutes now span the once tedious miles between San Francisco and Oakland, and preparations are complete for similar service to other hustling bay cities.

The original schedule of fifteen-minute sailings—"most frequent air ferry schedule in the world"—was found far too infrequent to supply opening traffic demands. The schedule was halved to seven minutes, and a total of 1630 passengers were transported the first three days of operation. On the third day, 384 passengers were carried in 384 flying minutes—a passenger a minute!

Substantial business men sponsor and direct the activities of Air Ferries, Ltd. They chose Keystone-Loening Amphibians as representative of their own sound business policies—swift, comfortable service with profitably low operating and maintenance costs. Their success is as much a matter of course as that of many other lines using these famous planes. Throughout the western hemisphere, from Alaska to Cape Horn, these sturdy boats of the air are clocking their schedules, earning substantial dividends. They are built for business!

We will gladly demonstrate to interested transport executives the ready adaptability and fitness of the Air Yacht for their requirements. Write Dept. K-73.



Joseph J. Tynan, Jr., President, Marshal Hale and Ted Huggins, Directors, of Air Ferries, Ltd., agree that their Loening Amphibians efficiently solve an important aerial transportation problem.

6 to 8 passengers : 525 H. P. : 100 M. P. H. Cruising Speed

KEYSTONE AIRCRAFT CORPORATION

DIVISION OF **CURTISS-WRIGHT**

SALES OFFICES: 27 WEST 57TH STREET, NEW YORK

AVIATION

THE OLDEST AMERICAN AERONAUTICAI MAGAZINE

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EDWARD P. WARNER, *Editor*

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Introduction

IT IS LESS THAN six months since our first statistical issue was launched, but things happen very rapidly in the aeronautical world. Six months is more than time enough for getting out of date, so here is the statistical record again, modernized and amplified.

It is not merely brought up to date from last October. Thanks to the time available for deliberation upon the results of our earlier effort, and thanks also to much-appreciated suggestions from many friends, much has been added of which the earlier attempt held no trace. Some wholly new material has been secured from official sources. Some of that which was previously available has been given more extensive and clearer interpretation. Finally, we have made inquiries of our own to supplement the official data.

Questionnaires upon operations have been addressed to all the flying schools, airports, airplane manufacturers, and transport lines in the country. To the hundreds of individuals and organizations that have returned those questionnaires we cannot make individual acknowledgment, but on our own behalf and on that of our readers we take this opportunity of thanking them collectively for the trouble that they took. We hope that each of them will extract enough of personal interest from the collective presentation and interpretation to recompense him for the time spent over his own contribution.

It was with some little timidity that we first promulgated a statistical issue, and with a frank expectation that manifold errors would be discovered. A few were pointed out to us, and we have found a number for ourselves, but it is a great satisfaction to be able to report that most of them proved to be of minor significance. Our request that errors be brought to our attention still stands, but we are now sufficiently emboldened to hope that they will not be very numerous or serious.

The aircraft industry has been moving and changing with extraordinary rapidity in recent months, but that state of flux does not lessen the value of statistics. Rather does it enhance their significance. When the ground is shifting under our feet with bewildering suddenness, a definite record of experience and a printed and numerical record of the existing state of affairs are firm supports to which to cling.

There remains only the pleasant obligation of repeating and extending the list of acknowledgments presented last October. Without the most generous assistance from both official and unofficial sources it would be impossible to prepare such a manual. Especially pronounced is our indebtedness to the officials of the Aeronautics Branch and the Aeronautics Trade Division of the Department of Commerce, to those of the Aeronautical Chamber of Commerce, and to the personnel of the National Advisory Committee for Aeronautics. We should like to enumerate individually those who particularly helped us, but the list would grow formidably long and even then would be sure to be incomplete. The War and Navy Departments, the Weather Bureau, the National Aeronautic Association, and the Canadian civil aviation authorities have been generous in compiling data concerning their own activities. In a number of cases the officials of governments and of air lines in European and other foreign countries have been good enough to furnish us with special reports. Among published volumes found especially useful, mention should be made of the yearbooks of the Aeronautical Chamber of Commerce, "The Air Annual of the British Empire," and the several volumes of "L'Année Aéronautique." Among official foreign documents the annual reports on civil aviation of the British Air Ministry, the Armaments Yearbook of the League of Nations, "Deutsche Luftverkehrsstatistik," and the "Statistica delle Linee Aeree Civili Italiane" have been particularly helpful.

For the assistance drawn from all these sources and others we are deeply appreciative, but only in a few instances has any material been given by direct transcription from any official document. The form of presentation and the interpretation remain our own. For any errors that may have been introduced there, as for any merit that they possess, we must accept the full responsibility.

TACOMA PUBLIC LIBRARY

Licensing AND *Production*

IN 1929 is shown the first check for six years on the acceleration of aircraft production. Not only has there been an increase in every year, but in every year until 1929 a new record in percentage of advance over the previous year has been set up. The climb began with a seventeen per cent increase of production in 1924 and reached the astounding figure of 130 per cent in 1928. In 1929 it dropped back to only a 27 per cent advance.

The aggregate value of production of planes and engines, not including spare parts, rose from approximately $46,000,000 in 1928 to $71,000,000 in 1929, a 55 per cent rise, largely the result of increases in the number of engines produced and in the average unit value of the commercial airplane.

While the commercial airplane production (military not included) was increasing by only 51 per cent in 1929, the output of commercial engines was practically tripled, due to the lessened importance of the war surplus engine as a factor. In 1928 there had been only 0.52 commercial engines per airplane. In 1929, the corresponding ratio was 1.03.

There is a marked change in the distribution of production between the last two years. Multi-engined transports have increased from 1.8 to 3.5 per cent of the commercial total. Seaplanes and flying boats from 0.3 per cent have risen to 0.6, and amphibions from 0.8 to 2.6. Cabin planes have made substantial progress at the expense of the open cockpit type, and monoplanes at the expense of biplanes. "Cabin monoplane" is coming almost to be one word, the cabin biplane having decreased to less than one per cent of the total production.

Military production, although now almost insignificant in contribution to the total numbers (only eleven per cent in 1929), remains an important item in aggregate value. Twenty-four per cent of the total valuation of airplane production, and 32 per cent for power plants, went to a military market.

Commercial Engine Production

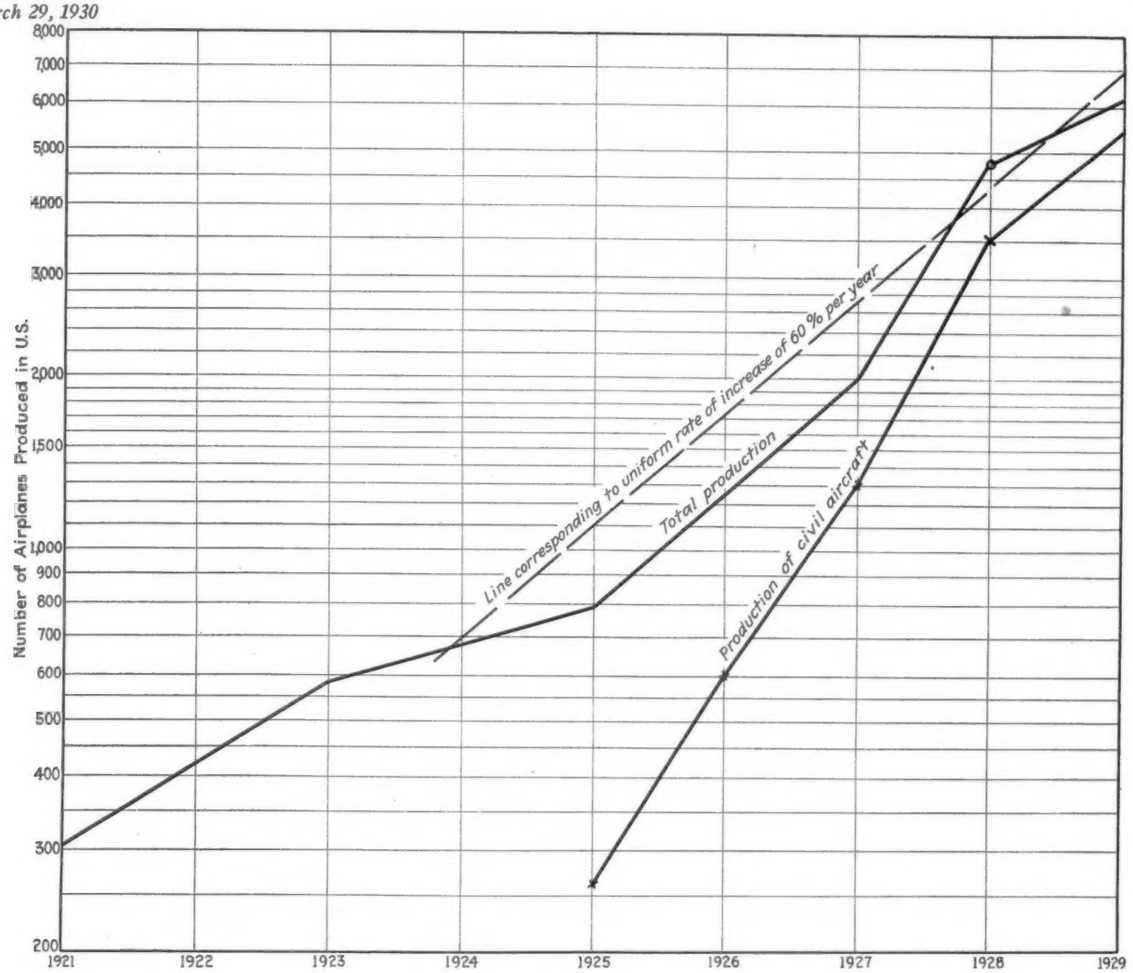
1928 Hp.	Number	Value	Average Unit Value
0– 50	32	.....	.....
50–100	237	.....	.....
100–200	182	.....	.....
200–300	924	.....	.....
300 and up	475	.....	.....
Total	1,850	$8,936,725	$4,830
Total with military	3,263	.....	.....

1929 Hp.	Number	Value	Average Unit Value
0– 75	479	$367,950	$768
76–125	1,309	2,013,750	1,538
126–175	1,208	3,158,000	2,614
176–225	565	1,638,500	2,900
226–300	552	1,990,000	3,623
301 and up	1,404	8,727,100	6,215
Total	5,517	$17,895,300	$3,243
Total with military	7,378	26,495,830	3,591
Per cent increase in numbers of commercial production over 1928			198%
Per cent increase in value of commercial production over 1928			100%

Commercial Aircraft Production

Types	1928	Total Value 1928	Average Value 1928	Jan.-June 1929	July-Dec. 1929	Total 1929	Total Value 1929	Average Value 1929	Per Cent Increase in Number Over 1928	Per Cent Increase in Value Over 1928
Monoplanes										
Open cockpit	171	.....	....	144	176	320	$871,890	2,724	87	...
Closed cockpit	850	.....	....	884	678	1,562	10,557,635	6,759	84	...
Multi-engined trans	58	.....	....	115	63	178	6,122,742	34,397	207	...
Total monoplanes	1,079	$8,738,683	$8,098	1,143	917	2,060	$17,552,267	$8,569	91	101
Biplanes										
Open cockpit	2,348	.....	....	1,623	1,448	3,071	10,415,599	3,391	31	...
Closed cockpit	69	.....	....	17	30	47	598,040	12,724	(*)	...
Multi-engined trans	5	.....	....	0	8	8	505,000	63,125	60	...
Total biplanes	2,422	$7,541,615	$3,113	1,640	1,486	3,126	$11,518,639	$3,684	29	53
Total open cockpit	2,519	.....	....	1,767	1,624	3,391	11,287,489	3,328	35	...
Total closed cockpit	919	.....	....	901	708	1,609	11,155,675	6,933	75	...
Total multi-engined trans	63	.....	....	115	71	186	6,627,742	35,633	195	...
Seaplanes and flying boats	11	.....	....	18	14	32	834,950	26,092	191	...
Amphibions	30	.....	....	53	86	139	3,718,900	26,754	363	...
Total seaplanes, flying boats and amph.	41	914,000	22,292	71	100	171	4,553,850	26,630	319	398
Grand total (commercial)	3,542	$17,194,298	$4,854	2,854	2,503	5,357	$33,624,756	$6,276	51	89
Total production (commercial and military)	4,761	.....	....	3,381	2,653	6,034	44,457,300	7,367	27	...

(*) Decrease of 32 per cent.



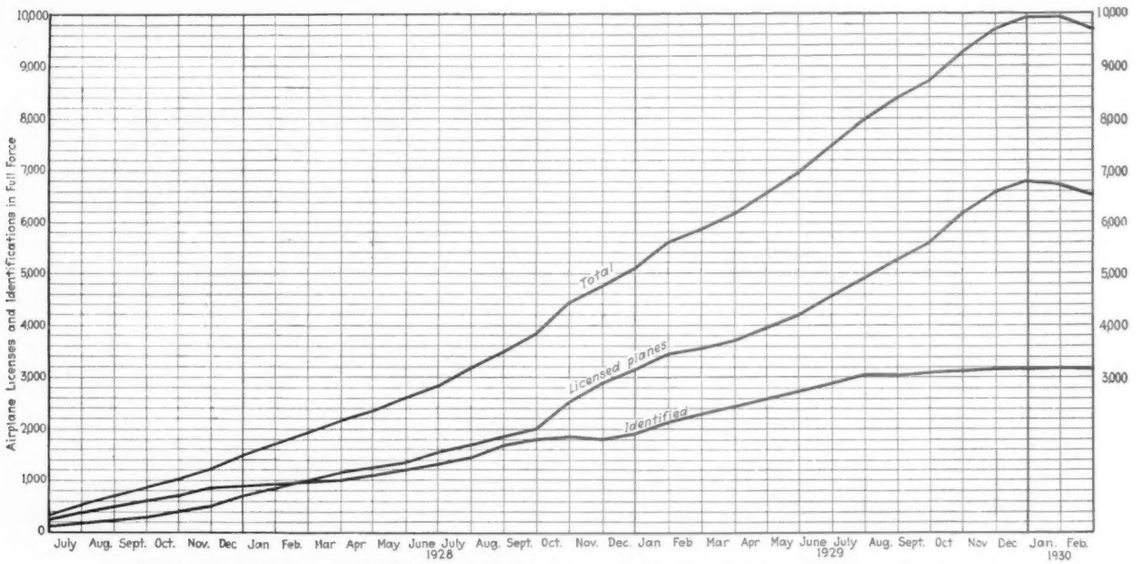
American Aircraft Production, 1921-1929

Style of Aircraft Licensed in United States as of January 15, 1930

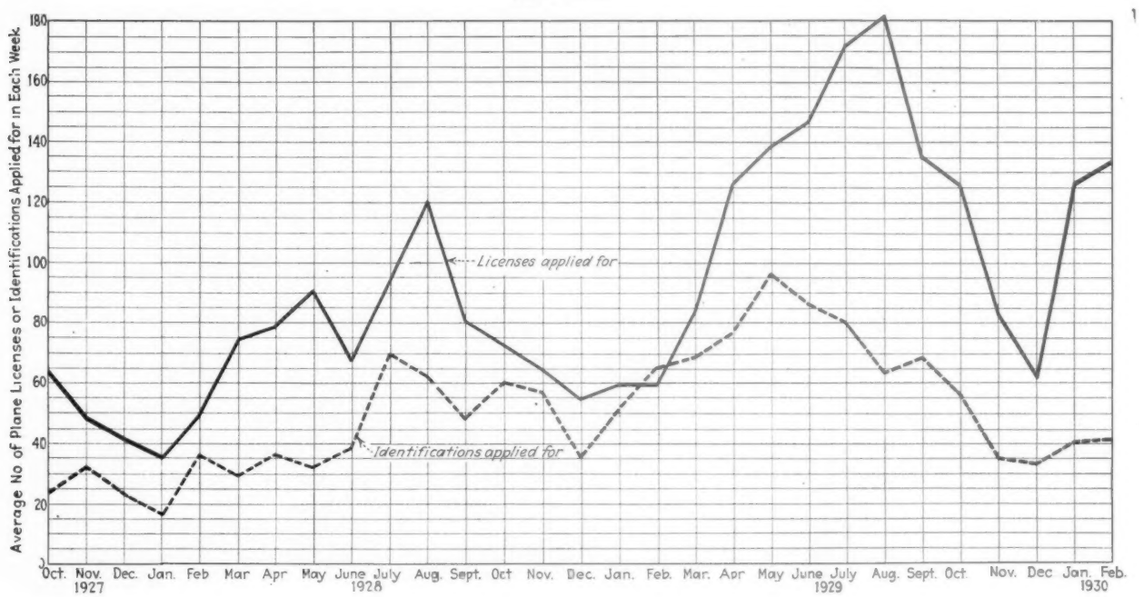
Biplanes	
Open Cockpit	
Landplanes	4,210
Seaplanes	7
Amphibions	10
Flying Boats	13
Convertible Land or Seaplanes	2
Total Open Cockpit Biplanes	4,252
Cabin	
Landplanes	95
Amphibions	68
Flying Boats	12
Convertible Land or Seaplanes	1
Total Cabin Biplanes	166
Total Biplanes	4,418
Monoplanes	
Open Cockpit	
Landplanes	69
Seaplanes	6
Total Open Cockpit Monoplanes	75
Cabin	
Landplanes	1,422
Seaplanes	2
Amphibions	1
Flying Boats	5
Convertible Land or Seaplanes	402
Total Cabin Monoplanes	1,832
Total Monoplanes	1,907
Total Unclassified	306
Total Licensed Planes	6,631
Open Cockpit Biplanes	4,252
Open Cockpit Monoplanes	75
Total Open Cockpit Planes	4,327
Cabin Biplanes	166
Cabin Monoplanes	1,832
Total Cabin Planes	1,998
Total Unclassified	306
Total Licensed Planes	6,631

Analysis of Aircraft Licensed in United States as of January 15, 1930

Land Biplanes	
Open	
1 Pl.	105
1 Pl.	675
3 Pl.	3,382
4 Pl.	2
5 Pl.	48
Cabin	
1 Pl.	2
3 Pl.	20
4 Pl.	7
5 Pl.	39
6-8 Pl.	10
14 Pl.	6
19 Pl. up	12
Land Monoplanes	
Open	
2 Pl.	49
3 Pl.	18
6 Pl.	1
22 Pl.	1
Cabin	
1-2 Pl.	219
3 Pl.	579
4 Pl.	203
5 Pl.	234
6 Pl.	254
7 Pl.	113
8 Pl.	51
9 Pl.	2
10 Pl.	11
12 Pl.	1
13-14 Pl. up	60
15 Pl. up	60
Flying Boats and Seaplanes	
Open	
2 Pl.	8
3 Pl.	5
4 Pl.	11
6 Pl.	2
Cabin	
3 Pl.	4
4-5 Pl.	9
6 Pl.	4
7 Pl. up	2
Amphibians	
2-3 Pl.	5
4-5 Pl.	14
6 Pl.	3
7-8 Pl.	18
9 Pl. up	39
Unclassified	308
Total	6,631


Airplane Licenses and Identifications in Full Force
Total
Licensed planes
Identified
July Aug. Sept. Oct. Nov. Dec Jan Feb. Mar Apr May June July Aug. Sept. Oct. Nov. Dec. Jan Feb Mar Apr May June July Aug. Sept. Oct Nov Dec Jan. Feb.
1928
1929
1930

Airplane licensing and identification data. Note: The upper curve is based on licenses in force, the lower one on applications made. A peak or valley in the lower curve therefore shows its effect in the upper one only after an appreciable time-lag, corresponding to the time needed for issuing a license. The sharp upturn in the curve of licenses applied for since the beginning of the year is especially noteworthy. Not a single month in the last two years has failed to show an increase in the number of license applications over the corresponding month of a year earlier


Average No of Plane Licenses or Identifications Applied for in Each Week
Licenses applied for
Identifications applied for
Oct. Nov. Dec. Jan. Feb Mar Apr May June July Aug. Sept. Oct Nov. Dec. Jan. Feb. Mar. Apr May June July Aug. Sept. Oct. Nov. Dec Jan. Feb.
1927
1928
1929
1930

Periodic Airplane License and Identification Data

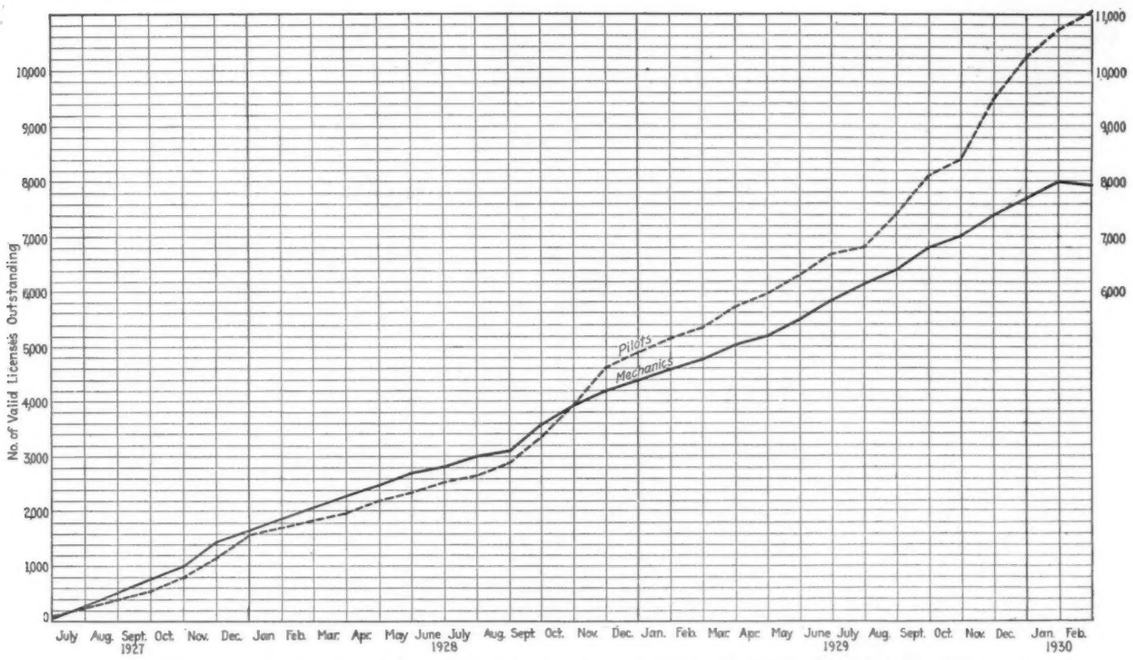
Quarterly Date	Licenses Valid	Identifications Valid	Total Licenses and Identifications	Ratio of Licenses to Total	New Licenses Applied for in Preceding Three Months	New Identifications Applied for in Preceding Three Months
June 30, 1927	147	237	384	0.383	.....	.....
Sept. 30, 1927	336	517	853	0.393	.....	.....
Dec. 31, 1927	681	832	1,513	0.450	660	336
Mar. 31, 1928	1,136	1,011	2,147	0.528	703	355
June 30, 1928	1,564	1,320	2,884	0.542	1,003	430
Sept. 30, 1928	1,980	1,819	3,799	0.522	1,245	768
Dec. 31, 1928	3,165	1,939	5,104	0.620	821	644
Mar. 31, 1929	3,702	2,462	6,164	0.600	883	807
June 30, 1929	4,546	2,885	7,431	0.612	1,791	1,119
Sept. 30, 1929	5,610	3,099	8,709	0.644	2,116	909
Dec. 31, 1929	6,803	3,199	10,002	0.680	1,141	549
Feb. 28, 1930	6,542	3,174	9,716	0.673	1,171*	373*

*Two months only.

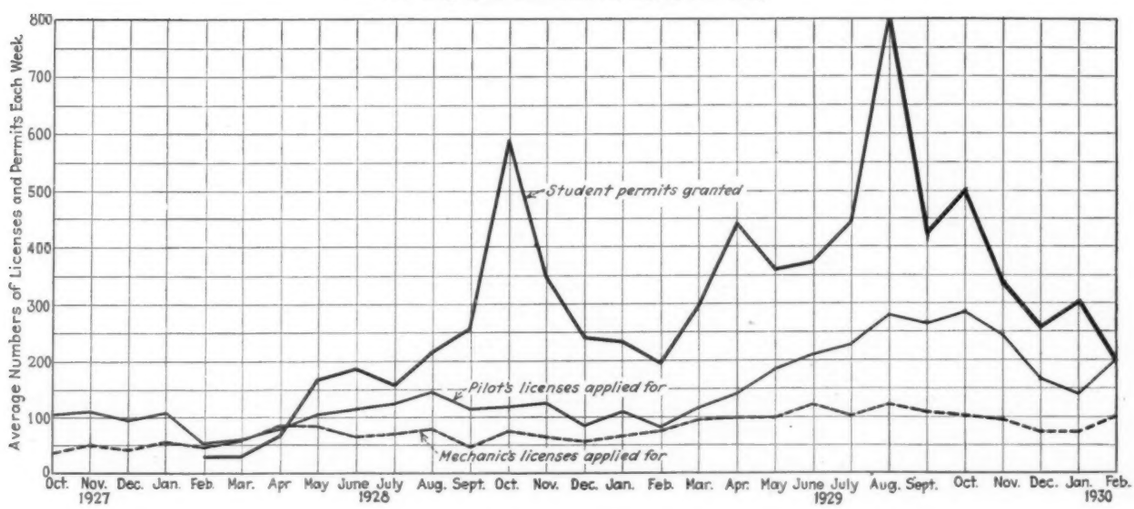
Periodical Records of Pilots' and Mechanics' Licenses

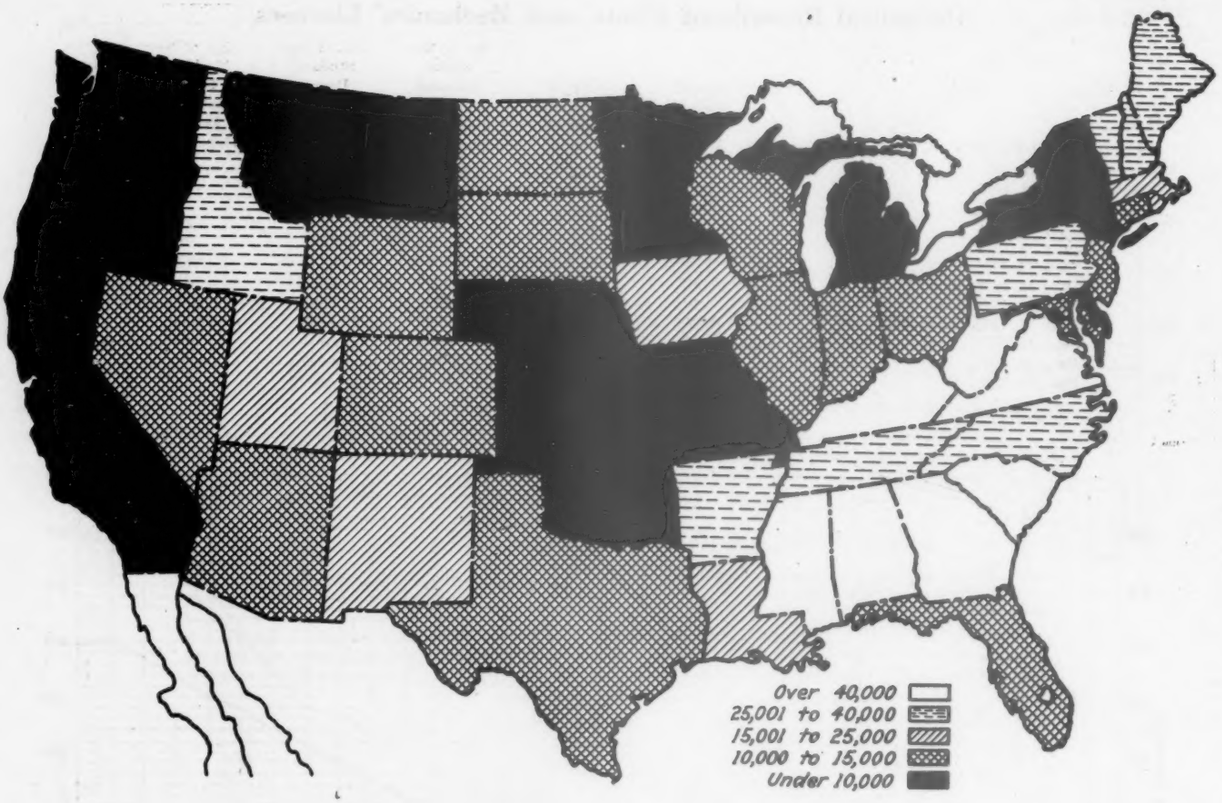
Quarterly Date	No. of Pilots' Licenses Valid	No. of Mechanics' Licenses Valid	No. of New Pilots' Licenses Applied for in Preceding Three Months	No. of New Student Permits Granted in Preceding Three Months	No. of New Mechanics' Licenses Applied for in Preceding Three Months
June 30, 1927	112	99	.....	.....	.....
Sept. 30, 1927	542	766	.....	.....	.....
Dec. 31, 1927	1,572	1,678	1,331	.....	536
Mar. 31, 1928	1,973	2,298	881	243	707
June 30, 1928	2,535	2,816	1,285	1,804	988
Sept. 30, 1928	3,340	3,102	1,659	2,793	831
Dec. 31, 1928	4,887	4,383	1,429	4,935	813
Mar. 31, 1929	5,701	5,042	1,353	3,191	1,035
June 30, 1929	6,761	5,847	2,394	5,097	1,305
Sept. 30, 1929	8,176	6,800	3,412	7,058	1,484
Dec. 31, 1929	10,287	7,701	3,048	4,656	1,195
Feb. 28, 1930	11,076	7,937	1,408*	2,295*	778*

*These figures are for two months only: January and February, 1930.



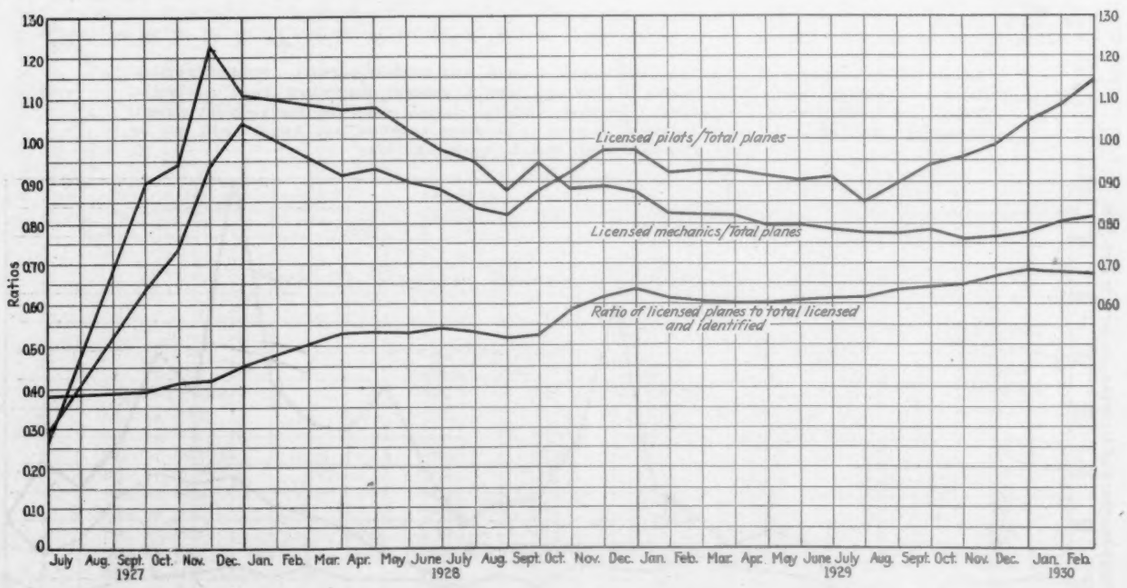
Record of the issuance of pilots' and mechanics' licenses and student permits. Student applications are running very slightly above a year ago, with a general downward trend continuing. Pilots' applications show a substantial increase, with the normal seasonal improvement already apparent. The effect of the very large number of students enrolled last August will not be fully displayed until March, April, and May





Population per Licensed or Identified Airplane, by States

Relations of licensed and identified planes, pilots, and mechanics. For the first time since licensing became well established, the pilots exceed the airplanes by more than ten per cent. Within the past three months, absolutely for the first time, the licensed planes have come to outnumber the merely identified ones by more than two to one



Factory Data

From Census of Manufacturers

Summary of (Aircraft) Manufacturers Census for the United States

Year	No. of Establishments	Wage Earners (Avg. No)	Average No. of Wage Earners per Establishment	Wages	Average Wage	Paid for Contract Work	Cost of Materials (1)	Value of Products	Value Added by Manufacture (2)	Horsepower (3)	Per Cent Which Minimum Forms of Maximum No. of Wage Earners During Year (5)
1914....	16	168	11	$134,827	803	$12,428	$133,939	$789,872	$655,933	195	68.2
1919....	31	3,543	114	4,906,740	1,386	13,645	7,126,965	14,372,643	7,245,678	12,512	51.0
1921....	21	1,395	66	2,202,307	1 580	1,324	2,407,395	6,641,988	4,234,593	1 (4)	70.9
1923....	33	2,901	88	4,521,949	1,558	149,464	3,829,574	12,945,263	9,115,689	5,443	76.4
1925....	44	2,701	61	4,222,151	1,562	249,540	2,869,967	12,524,719	9,654,752	3,735	72.3
1927....	70	4,422	63	6,857,014	1,553	.....	7,517,183	21,161,853	13,644,670	6,031	(4)
1929....	124	22,082	178	.....	....	.....	.....	.....	.....	.....	....

(1) Including cost of fuel, electric power and shop supplies.
(2) Value of products less cost of materials.
(3) Total primary horsepower of factory power-plant equipment.
(4) Not called for on schedule.
(5) To show extent to which operations were seasonal.

	Number of Establishments with Aggregate Product of					Wage Earners in Establishments with Product of				
Year	Less than $5,000	$5,000 to $20,000	$20,000 to $100,000	$100,000 to $1,000,000	Over $1,000,000	Less than $5,000	$5,000 to $20,000	$20,000 to $100,000	$100,000 to $1,000,000	Over $1,000,000
1914.....	4	6	5	1	..	6	23	*139*	(x)	.....
1919.....	2	9	5	10	5	(x)	*29*	70	456	2,988
1921.....	4	6	4	10	1	4	15	49	*1,351*	(x)
1923.....	..	3	13	12	5	..	6	100	1,072	1,723
1925.....	..	6	19	16	3	..	18	197	1,273	1,213
1927*.....	..	..	..	..	..	..	..	...	.....	.....

(x) placed in either previous or next classification, as shown by *italics*, to avoid disclosing data regarding an individual firm.
*No statistics have been compiled by the Census Bureau showing the number of establishments by value of product or number of wage earners in establishments by value of product for 1927.

Number of Establishments Employing

Year	Total		No Wage Earners	1–5 Wage Earners		6–20 Wage Earners		21–50 Wage Earners		51–100 Wage Earners		101–250 Wage Earners		251–500 Wage Earners		501 and Over* Wage Earner	
	No. of Est.	No. of W. E.	No. of Est.	No. of Est.	No. of W. E.	No. of Est.	No. of W. E.	No. of Est.	No. of W. E.	No. of Est.	No. of W. E.	No. of Est.	No. of W. E.	No. of Est.	No. of W. E.	No. of Est.	No. of W. E.
1914.....	16	168	1	8	20	5	65	1	24	1	59	..	...	..	.....	..	.....
1919.....	13	3,543	2	10	30	5	59	4	150	2	191	2	320	4	1,656	2	1,137
1921.....	21	1,395	..	7	16	3	33	3	78	..	...	7	995	1	273	..	.....
1923.....	33	2,901	2	6	17	8	88	3	99	4	282	6	930	3	908	1	577
1925*.....	44	2,701	..	..	..	..	..	..	...	..	...	..	...	..	.....	..	.....
1927*.....	70	4,422	..	..	..	..	..	..	...	..	...	..	...	..	.....	..	.....
1929 (May).....	124	22,082	..	..	..	..	..	..	...	..	...	..	...	..	.....	..	.....

*No statistics have been compiled by the Census Bureau showing number of employees by size of plant for 1925 and 1927.

Personnel

Year	Total Employees	Officials	Clerks	Wage Earners	Salaries	Wages
1914.....	444	9	45	168	$61,434	$134,827
1919.....	8,404	14	645	3,543	2,000,690	4,906,740
1921.....	1,952	2	555	1,395	1,033,001	2,202,307
1923.....	3,496	8	587	2,901	1,637,653	4,521,949
1925.....	3,363	6	656	2,701	1,569,198	4,222,151
1927.....	5,499	13	1,064	4,422	2,289,054	6,857,014
1929 (May).....	*	*	*	22,082	*	*

*Figures for 1929 are not available.

Classification of Licensed Aircraft

| State | Biplanes | | |

by State, Type, and Capacity

| Monoplanes | | |

Classification of Licensed Planes as of Jan.

	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Dist. of Columbia	Florida	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	NewYork
American Eagle	7	1	3	23	1	...	...	...	...	...	...	1	5	6	32	1	1	...	1	11	15	12	...	23	2	3	...	...	3	...	13
Aristocrat	...	...	...	...	...	...	...	...	...	...	...	1	2	...	...	...	2	...	...	...	3	...	...	...	...	...	...	...	...	...	12
Arrow	...	...	...	5	...	...	...	...	...	...	...	...	1	1	6	...	...	...	...	3	2	...	...	2	...	12	...	...	...	...	4
Avian	...	...	...	7	...	21	...	...	...	...	...	3	...	...	...	...	...	...	...	1	...	...	...	2	...	...	...	...	...	...	6
Bellanca	...	...	...	1	...	...	21	...	...	...	...	5	...	...	...	...	...	...	2	3	2	...	...	1	...	1	...	...	...	...	6
Boeing	...	...	...	12	...	2	...	1	...	...	...	7	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
Buhl	...	...	...	6	...	...	...	2	...	...	...	1	...	...	...	...	1	...	...	1	7	...	...	...	1	...	...	...	...	...	...
Cessna	...	...	...	9	1	...	...	...	3	...	...	2	4	1	5	2	...	...	5	3	2	1	...	3	...	1	...	...	2	...	22
Challenger	...	...	...	3	...	17	2	...	...	2	...	7	...	1	...	...	...	1	26	9	11	...	...	1	...	...	...	1	6	...	37
Command-Aire	...	...	15	16	...	2	...	3	2	...	...	10	4	...	3	...	5	...	1	11	4	2	5	6	1	...	...	...	6	...	39
Curtiss Fledgling	...	...	...	8	...	4	...	...	2	...	...	9	3	1	2	2	...	1	3	7	7	...	...	1	...	1	...	...	...	...	24
Curtiss Miscellaneous	...	...	...	...	...	...	...	...	...	...	...	12	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	8
Curtiss Robin	...	3	2	56	3	11	...	...	7	2	...	40	25	5	7	9	...	1	7	22	19	9	...	66	...	7	...	...	20	...	119
Eaglerock	...	5	1	67	30	2	...	1	8	4	4	31	11	4	6	...	3	...	3	13	15	10	4	19	3	7	1	...	14	5	25
Fairchild	1	3	...	10	...	...	...	3	...	...	...	7	3	2	...	...	...	...	2	4	1	2	...	5	...	...	...	...	1	...	63
Fokker	...	...	...	33	3	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	7	...	...	23	...	...	...	...	10	...	21
Ford	...	2	...	11	...	2	...	1	...	...	...	4	...	...	...	...	...	...	...	1	20	2	...	3	...	...	...	...	...	...	30
Fleet	...	2	1	24	1	5	...	1	...	...	...	8	3	2	...	...	2	...	...	1	6	...	...	25	...	...	...	...	1	1	49
Great Lakes	...	2	...	6	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	2	3	...	...	2	1	...	...	1	1	...	3
International	...	...	...	13	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lincoln	...	...	...	15	...	...	...	1	1	1	...	6	2	4	8	...	6	...	...	...	2	...	...	4	...	22	...	...	...	...	1
Lockheed	...	...	...	28	...	...	...	2	...	1	...	1	...	...	...	...	...	...	...	...	6	2	...	2	...	...	...	...	...	...	3
Loening	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	3	...	...	...	...	...	...	...	...	...	12
Monocoupe	1	2	...	37	...	...	...	...	3	...	...	19	6	8	3	1	1	...	...	...	7	2	...	7	2	2	...	...	1	...	4
Monoprep	...	...	...	3	...	...	...	...	1	1	...	12	...	...	4	...	...	...	...	1	1	...	...	1	1	...	...	...	1	...	3
Moth	...	...	...	12	...	...	1	3	...	...	...	4	1	...	...	1	3	1	2	29	2	...	...	2	...	...	...	1	4	...	21
New Standard	...	...	...	...	...	6	...	4	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	17	...	16
Nicholas Beazley	...	...	...	8	...	2	...	...	...	...	...	1	1	1	...	...	...	...	...	...	2	...	...	9	1	...	...	...	...	...	...
Parks	...	...	...	...	...	1	...	...	...	...	...	33	...	...	...	...	1	...	...	...	...	...	...	7	...	...	...	...	...	...	1
Pitcairn	...	...	...	2	...	...	1	3	...	2	...	1	1	...	...	...	1	...	...	1	2	...	...	2	...	...	...	...	1	...	17
Ryan	1	1	...	29	1	...	...	1	1	...	1	5	5	2	2	2	4	...	...	2	4	1	...	18	1	1	1	...	1	2	6
Sikorsky	...	...	...	...	...	3	...	...	1	...	...	6	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	34
Spartan	...	...	...	3	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	2	3	...	...	...	...	...	...	3	1	2
Stearman	...	...	...	42	1	...	1	9	...	...	2	9	3	2	6	1	6	2	...	4	3	...	...	4	1	...	...	...	2	...	16
Stinson	...	...	2	15	...	2	...	2	...	...	...	15	2	4	3	...	1	...	...	1	26	5	...	7	3	3	...	...	4	...	26
Swallow	3	...	2	24	1	...	...	...	1	1	1	24	5	...	34	1	1	...	2	...	2	1	...	4	...	1	...	1	4	...	13
Travel Air Biplane	4	4	6	116	3	6	1	5	7	6	1	38	13	13	102	4	7	2	4	18	37	6	1	51	7	19	...	1	24	2	63
Travel Air Monoplane	...	...	...	16	2	1	...	3	...	1	...	6	1	1	17	...	3	...	1	3	3	1	...	1	1	1	...	...	2	...	8
Waco	2	2	5	105	2	5	3	5	16	8	1	75	42	22	7	10	6	1	3	16	68	23	5	35	6	11	2	9	27	...	136
Miscellaneous	2	1	1	109	1	8	2	9	6	1	1	67	3	6	15	...	9	...	4	9	28	12	...	26	...	4	...	...	17	3	89
Total	21	28	38	876	50	100	32	59	59	30	11	479	146	87	264	34	66	9	67	178	316	101	15	365	31	96	4	14	172	14	951

THE TABULATIONS on these pages, together with that on pages 564 and 565 show the geographical variation of tastes in airplane types. It shows, also, the extent to which some manufacturers depend, by choice or by force of circumstance, upon a home market.

To take an outstanding example, the three-passenger open cockpit biplane accounts for almost exactly one-half of the total number of registered airplanes. In California the proportion runs true to the national average. In New York it drops to 38 per cent. In the prairie states it runs up into the neighborhood of two-thirds in several instances. In the states where relatively little flying is practiced, most of it is likely to be with that type of machine, and in Alabama, New Hampshire, Vermont, and even in Alaska, where the climate might provide ample reason for selecting a cabin type, the open three-seater has the field almost to itself.

New York and other eastern states where flying is extensively practiced as a sport have an unusually large number of two-passenger open biplanes. Of course the supremacy of New York in the operation of amphibions and flying boats is almost axiomatic, although there is no apparent reason why other seaboard states with wealthy industrial centers of their own should leave some 60 per cent of the nation's total seaplane and flying boat development to a single commonwealth. Of course a part of that seemingly exaggerated concentration of seaplane ownership is due to the registration in New York of planes belonging to companies having their offices there, but operating along the coast and in Latin-American waters. Similarly, the apparent concentration of almost all the large cabin monoplanes in the United States, in California, New York, Michigan, and Missouri represents only their ownership by transport companies always taking out their licenses from their official headquarters.

An analysis of the table given above suggests in several instances the inclusion of a stock of unsold planes still licensed from the factory where they were

15, 1930

North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Dakota	South Carolina	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Alaska	Hawaii	Foreign	TOTAL
1	...	14	8	...	4	2	2	1	3	17	...	...	...	1	...	9	...	...	1	...	227
...	...	1	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	23
...	...	...	1	1	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	42
...	...	2	...	...	6	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	49
...	...	1	2	...	2	...	...	...	2	...	...	...	...	...	1	...	...	...	...	...	51
...	...	...	1	2	1	...	...	...	...	...	1	...	...	70	...	...	...	...	...	...	98
...	...	3	5	...	...	...	...	...	...	1	...	...	...	4	...	...	...	...	...	...	32
2	...	7	3	...	1	1	...	...	4	3	...	...	...	...	...	...	...	...	...	...	87
3	...	5	...	...	38	3	1	1	...	3	...	1	3	1	...	4	...	...	...	...	187
4	...	3	6	...	1	1	...	1	7	10	...	1	...	2	...	1	...	...	...	...	172
2	...	6	4	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...	91
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	22
9	3	23	16	1	12	3	3	2	13	26	1	1	2	3	1	5	...	...	...	...	564
2	6	14	10	8	23	1	12	3	3	17	4	...	15	10	3	10	8	...	...	...	445
...	...	8	1	...	15	1	1	...	1	2	...	...	...	...	...	5	...	...	...	...	141
...	...	1	...	...	...	...	...	...	1	3	3	...	...	...	...	...	...	...	...	...	107
...	...	3	9	...	2	...	1	...	...	1	...	...	...	2	...	...	...	...	...	...	94
...	...	6	10	...	15	1	...	...	...	7	...	...	...	1	2	5	...	...	...	...	179
...	...	9	...	2	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	40
...	...	6	...	...	2	...	...	1	...	...	...	...	...	2	...	1	...	...	...	...	28
...	...	5	1	1	1	...	1	...	...	...	...	...	...	1	...	2	1	...	...	...	86
...	2	3	6	...	...	...	...	...	...	3	...	...	...	3	...	1	...	...	...	...	63
...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	22
4	2	12	5	...	12	...	10	...	2	4	1	...	...	2	1	17	...	...	...	...	178
1	...	2	1	2	7	...	...	...	...	3	...	...	...	...	...	1	...	...	...	...	46
1	...	7	1	...	3	...	...	...	2	6	...	1	1	...	...	...	...	...	...	1	110
...	...	1	...	...	4	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	52
...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	28
...	...	1	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	47
2	...	4	...	...	28	...	...	2	...	3	...	...	2	...	...	...	...	...	...	...	75
...	1	7	4	3	10	1	4	...	...	16	2	...	2	3	...	7	...	...	...	...	152
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	47
...	...	...	57	1	2	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...	82
...	...	5	6	...	...	...	1	...	...	5	3	...	...	4	...	...	...	...	...	...	138
1	1	12	10	2	6	...	...	...	7	17	1	1	...	3	...	3	...	1	...	...	187
...	1	15	4	...	7	1	...	...	...	11	...	...	...	3	...	7	...	1	1	...	177
1	4	37	26	9	43	...	1	...	4	42	5	1	4	8	3	17	3	1	1	...	781
1	...	6	3	1	5	...	1	...	...	18	...	...	...	...	...	1	...	...	...	...	107
9	4	100	12	9	73	2	1	2	11	27	1	6	9	14	2	52	...	1	...	...	993
...	2	51	9	6	23	6	...	...	2	19	...	...	1	7	...	20	...	...	2	...	581
43	26	383	221	48	349	24	41	13	64	273	22	12	40	150	15	168	12	4	8	2	6631

built. That conclusion too, however, is easily exaggerated, for in some cases an astonishingly large proportion of the actual sales are made in the immediate neighborhood of the factory, and the license properly remains credited to the state in which the plane was built.

Thus, to compare only the two makes which have the largest numbers of outstanding licenses, and which fortunately happen to be made in widely separated parts of the country, in Ohio, its home state, the Waco outnumbers the Travel Air by more than two to one. In Kansas, the ratio is reversed and magnified, the Kansas-built machine leading its competitor by over fifteen hundred per cent. Eliminating the effect of factory registration entirely and taking neighboring states, the Travel Air still has a good lead to its credit in Nebraska and in Oklahoma, while the Waco turns the tables, also by a liberal margin, in New York and Pennsylvania.

In Colorado, neither one of the machines previously mentioned has more than a scattering handful of licenses, the Eaglerock sweeping the field. Not only in Arkansas, where it has a commanding lead, but in Mississippi and Louisiana the Command-Aire is far out among the leaders. The Spartan, with two-thirds of its total registration in Oklahoma and with more planes listed in the neighboring state of Texas than in New York and California combined, is another outstanding case. Although only 40 per cent of the total registration of the country is in the four states most thickly populated by aircraft, more than four-fifths of the makes of planes listed in the table have over half their product in some four states, and in a number of instances more than 70 per cent of the licenses are held within as restricted an area as that.

Remarks on Pilot Data

(See page 572 for figures)

ALTHOUGH the proportion of total pilots' licenses that are of the lowest class is steadily increasing, this is probably largely due to transitory conditions and to the taking of private licenses by pilots who hope to be changed to a higher grade as soon as their training has progressed far enough. It remains true, and the fact is more clearly shown than last summer, that the proportion of private pilots' licenses runs highest and that of transport certificates lowest in the states where flying as a sport has been most popular, and where state law requires that every pilot hold a Federal license or at least make things convenient for him to do so as a means of escaping stringent state regulations. Thus, in Massachusetts more than two-thirds the total number of licenses are of the private class, while in Kentucky and in Texas the proportion is less than a third. In New Jersey, New York and California, also, the proportion of private licenses runs well up to, or even above, a half.

Abnormalities in the ratio between pilots and airplanes are likely to be more apparent than real. Thus, the number of licensed pilots in the District of Columbia and Virginia, and to a lesser extent in California, is exaggerated by the use of those territories as mail addresses by many military and naval aviators, most of whom hold transport licenses but neither own nor operate private planes. That accounts for more than 75 per cent of Virginia's pilots holding licenses of transport grade. On the other hand, in some states having a large share in the aircraft industry, particularly Kansas, Missouri, and New York, the ratio is reduced below its true value by the exaggeration of the number of planes accredited to the state, the planes often being licensed in the name of the original manufacturer and charged to the address of the factory until final sale to the ultimate user.

Variations in the relationship between licensed and identified planes can also be accounted for on logical grounds. In the states where a Federal license is required for any type of commercial operation or where a state license must be secured unless a Federal one is held, the ratio naturally runs very high. Where there is no state control, the proportion of licensed machines falls to much lower levels.

Classification of Engines in Licensed Planes as

	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Dist. of Columbia	Florida	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York
Axelson	...	...	1	6	...	...	...	...	...	...	...	4	...	...	1	...	...	...	...	...	...	...	...	2	...	...	...	...	1	1	2
Challenger	...	3	3	44	5	9	...	1	5	1	...	20	7	2	8	6	...	1	6	18	14	5	...	39	1	5	...	...	11	...	66
Curtiss Miscellaneous	...	...	...	2	...	1	...	...	1	...	...	1	1	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	6
Kinner	2	1	2	51	4	2	...	1	2	...	...	7	7	5	34	...	2	...	...	5	10	6	1	14	1	11	...	...	9	2	56
Le Blond	...	...	...	20	...	1	...	1	...	...	...	9	3	2	1	...	...	...	1	4	11	2	...	13	1	8	...	...	4	...	72
P & W Hornet	...	...	...	11	...	1	...	...	1	...	...	10	...	...	...	...	1	...	...	...	2	3	...	5	...	...	...	...	1	...	9
P & W Wasp	1	4	...	71	3	6	...	4	...	1	...	15	1	1	6	...	1	...	...	...	16	10	...	33	2	1	...	...	4	...	111
Velie	1	2	...	44	...	...	...	...	1	...	...	23	6	12	8	1	1	...	1	...	10	1	...	9	3	6	...	...	2	...	8
Walter	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	3
Warner Scarab	...	4	2	19	1	5	...	1	2	...	...	14	8	5	4	1	...	...	...	9	15	2	2	23	1	1	...	...	4	1	48
Wright Cyclone	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	1	...	...	...	3	...	...	2	...	...	...	...	3	...	4
Wright Whirlwinds*	...	1	...	28	...	2	4	6	...	1	1	11	2	2	16	...	5	...	3	4	19	4	...	6	...	...	...	1	7	2	38
Wright J4	...	2	...	7	...	...	...	...	...	...	...	3	...	...	...	...	1	...	...	...	2	3	...	1	2	...	...	...	...	...	3
Wright J5	1	2	3	127	6	6	6	26	2	4	3	91	15	10	54	2	20	1	16	18	50	8	1	51	4	5	2	2	21	4	150
Wright J6	2	...	1	41	4	3	15	1	3	1	...	13	4	2	15	1	4	...	9	5	11	5	...	11	2	3	...	1	8	...	38
Miscellaneous	...	...	...	22	3	1	...	1	2	...	...	11	...	1	1	1	1	...	1	1	7	...	...	5	...	2	...	...	4	...	19
Total	7	19	12	494	26	37	25	42	19	8	6	232	54	42	149	12	39	2	37	64	170	49	4	214	17	42	2	4	80	10	573
WAR SURPLUS ENGINES																															
OX5	11	3	24	279	6	34	4	7	32	19	1	194	78	43	100	17	20	4	26	59	128	45	11	127	12	47	...	5	70	2	322
OXX6	...	...	...	14	1	3	...	1	5	1	1	2	...	1	4	3	...	1	...	11	7	1	...	5	...	4	...	1	4	1	6
Hispano Suiza	2	4	...	37	17	...	...	1	1	1	3	10	9	1	11	1	5	1	1	7	6	5	...	7	1	3	1	2	9	1	9
Liberty	...	...	...	9	...	...	...	6	1	...	...	25	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	3
Total	13	7	24	339	24	37	4	15	39	21	5	231	87	45	115	21	26	6	27	77	141	51	11	39	13	54	1	8	83	4	340
FOREIGN ENGINES																															
Cirrus	...	2	...	19	...	23	...	...	...	...	...	9	...	...	...	...	...	...	1	4	3	...	...	4	1	...	...	1	2	...	9
Gipsy	...	...	...	9	...	2	1	...	...	...	...	4	1	...	...	1	...	1	2	28	2	...	...	2	...	...	...	1	4	...	21
Siemens Halske	1	...	2	13	...	...	...	...	1	1	...	...	4	...	...	...	1	...	...	4	...	1	...	4	...	...	1	...	2	...	5
Miscellaneous	...	...	...	2	...	1	2	2	...	...	...	3	...	...	...	...	...	...	...	1	...	...	...	2	...	...	...	...	2	...	3
Total	1	2	2	43	...	26	3	2	1	1	...	16	5	...	...	1	1	1	3	37	5	1	...	12	1	...	1	2	10	...	38
Grand total	21	28	38	876	50	100	32	59	59	30	11	479	146	87	264	34	66	9	67	178	316	101	15	365	31	96	4	14	172	14	951

*The engines included in this item are not repeated under the breakdown of the Wright engines. The model is unknown, but it is presumed

TAKING THE LIST of licenses as a whole, the war surplus engines still play an outstanding role. The OX5 alone accounts for 38 per cent of the total number, the Hispano for four per cent more. As for the Liberty, that survives only in the planes of two transport companies, and in a dozen scattering machines outside their possession. Altogether, the war surplus types make up 44 per cent of the whole.

Nevertheless, they are on the high road to extinction. The rapidly increasing ratio of new-production engines to airplanes built, already noted on page 558, is a sign of the times. The tables above and to the right furnish another. When our first statistical issue appeared, based on data only six months earlier than those used here, the war surplus ratio, now 44 per cent, was 59. During the months from April to June last year the ten-year-old types contributed 47 per cent of the new licenses. In succeeding quarters the percentages were reduced successively to 35, 27, and 27. Another eighteen months should see the virtually final disappearance of the war types from new machines.

Much of what has been said elsewhere concerning irregularities of geographical distribution of airplanes applies also to engines. The war surplus engines, and the cheaper and smaller of the new types, tend to accumulate in the states where great concentration of wealth is unusual but where flying has become a recognized utility, to be practised on the best economic terms available. In Nebraska and Iowa, to select as examples states with not many airplane factories, the OX5 still makes up more than 50 per cent of total registrations. In Delaware and the District of Columbia it is well under 30.

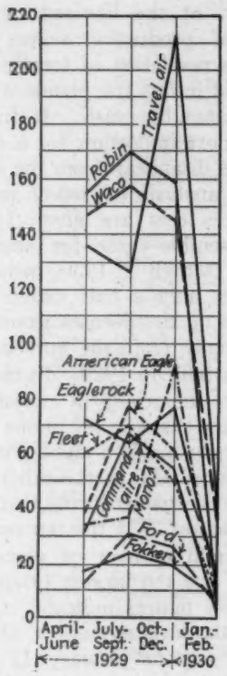
Local patriotism, or the hope that better service can be secured from a factory near at hand, are less potent influences in the selection of engines than of airplanes. The engine commonly goes along with the ship. Nevertheless, even the engines tend to deviate from a nationally uniform distribution in some cases.

The periodic license data for airplanes, on the opposite page, are most striking for their indication of the success with which some of the largest producers foresaw the letdown of last fall and prepared to adjust themselves to it. Thus, the six makes of planes of each of which 175 or more were licensed between last April and the end of the year received 57 per cent of all the licenses issued from April to June, 46 and 42 per cent in the next two quarters, and only 29 per cent in the current January and February. The smaller producers have been responsible for most of the increase in licensing during the last three months of the year.

of Jan. 15, 1930

North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Dakota	South Carolina	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Alaska	Hawaii	Foreign	TOTAL
...	...	1	...	...	1	...	...	...	...	1	...	...	...	2	...	1	2	...	...	...	26
4	...	16	12	...	4	...	...	...	10	22	1	1	1	1	1	1	...	...	...	...	354
...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15
...	...	16	6	...	19	3	1	...	...	8	...	...	...	1	2	4	...	...	1	...	296
...	...	5	...	1	4	...	...	...	...	1	...	...	...	7	...	1	...	...	...	...	112
...	...	2	3	2	...	...	...	...	...	...	...	...	...	45	...	3	...	...	...	...	99
...	1	19	18	1	6	...	...	...	1	8	4	...	...	24	...	3	...	...	2	...	378
3	3	13	6	2	18	...	9	...	2	8	1	...	...	2	1	16	...	...	...	...	223
...	...	...	18	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27
5	...	12	19	...	15	1	...	...	4	12	1	...	1	1	...	7	...	...	...	...	250
...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	17
...	...	15	7	...	14	...	2	...	6	9	1	1	...	2	1	3	...	1	...	...	225
...	...	1	1	2	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	31
4	3	42	50	5	56	2	6	...	7	56	5	1	2	13	...	27	1	1	...	1	993
1	...	14	9	2	15	1	1	...	2	27	1	...	1	5	...	6	...	...	1	...	289
1	1	12	...	...	9	1	...	...	1	2	...	...	...	...	...	3	...	...	...	...	113
10	573	18	8	168	150	16	165	8	19	...	34	155	14	3	5	104	5	75	3	2	4	1	3448
2	322	23	16	169	57	21	164	11	17	12	26	88	3	8	29	37	6	85	5	...	3	...	2510
1	2	9	3	...	2	2	...	...	1	2	...	...	...	1	1	3	...	2	...	...	...	106
1	9	...	...	13	3	6	7	...	3	1	1	17	5	...	4	7	1	5	4	...	1	...	234
...	3	...	...	1	...	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...	51
4	340	24	18	192	63	27	173	13	20	13	28	112	8	8	33	45	8	93	9	2	4	...	2901
...	9	...	...	14	...	4	6	...	2	...	...	...	...	...	...	1	...	...	...	...	...	...	105
...	21	1	...	6	1	...	3	1	...	...	2	2	...	1	1	...	...	...	...	...	...	1	98
...	5	...	...	3	7	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	54
...	3	...	...	...	...	...	...	...	...	...	...	4	...	...	1	...	2	...	...	...	...	...	25
...	38	1	...	23	8	5	10	3	2	...	2	6	...	1	2	1	2	...	...	...	...	1	282
14	951	43	26	383	221	48	349	24	41	13	64	273	22	12	40	150	15	168	12	4	8	2	6631

that the majority are J5's.



Licenses Recently Granted, by Makes

Numbers of planes licensed, by makes and quarterly periods, in the last year

Make	April to June, 1929	July to Sept., 1929	Oct. to Dec., 1929	Total Nine Months	Jan. and Feb., 1930	Total Eleven Months
American Eagle	38	79	63	180	14	194
Aristocrat	11	10	2	23	...	23
Arrow	8	15	24	47	6	53
Avian	12	22	14	48	1	49
Bellanca	4	13	19	36	2	38
Bird	6	13	19	38	2	40
Boeing	15	10	29	54	4	58
Cessna	25	16	32	73	4	77
Challenger	25	54	49	128	12	140
Command-Aire	32	67	55	154	2	156
Curtiss Fledgling	28	46	18	92	...	92
Curtiss Robin	155	171	160	486	8	494
Eaglerock	73	64	77	214	12	226
Fairchild	25	30	9	64	3	67
Fokker	18	25	20	63	6	69
Ford	13	31	27	71	5	76
Fleet	60	70	49	179	3	182
Great Lakes	.....	7	33	40	11	51
Lincoln	7	12	29	48	11	59
Lockheed	8	23	22	53	4	57
Loening	6	10	5	21	7	28
Monocoupe and Monocoach	34	28	60	122	15	137
Monoprep and Monosport	.....	9	31	40	4	44
Moth	9	23	59	91	35	126
New Standard	13	22	13	48	3	51
Nicholas Beazley	.....	.....	25	25	9	34
Parks	1	10	31	42	3	45
Pitcairn	11	14	9	34	3	37
Ryan	11	31	28	70	7	77
Sikorsky	10	7	17	34	13	47
Spartan	6	14	47	67	14	81
Stearman	24	19	25	68	9	77
Stinson	14	44	54	112	7	119
Swallow	38	39	26	103	10	113
Travel Air Biplane	99	95	183	377	32	409
Travel Air Monoplane	37	33	31	101	8	109
Waco	147	158	144	449	36	485
Miscellaneous	44	109	138	291	63	354
Total	1,067	1,443	1,676	4,186	388	4,574

Engines in Planes recently Licensed, by Makes

Makes	April to June, 1929	July to Sept., 1929	Oct. to Dec., 1929	Total, Nine Months	Jan. and Feb., 1930	Total, Eleven Months
American Engines						
Axelson	5	6	10	21	3	24
Cirrus	12	28	48	88	13	101
Comet	14	3	5	22	...	22
Curtiss	88	187	113	38	7	395
Hess	.....	2	9	11	2	13
Kinner	32	114	130	276	34	310
Lambert Velie	36	40	88	164	21	185
Le Blond	8	30	53	91	25	116
P & W Hornet	17	13	34	64	8	72
P & W Wasp	77	120	93	290	28	318
Warner Scarab	93	60	34	187	11	198
Wright Cyclone	5	13	5	23	2	25
Wright Whirlwind	156	281	497	934	82	1,016
Miscellaneous	.....	.....	3	3	1	4
War Surplus Engines						
Hispano Suiza	49	37	56	142	16	158
Liberty	1	6	1	8	...	8
OX5	427	454	394	1,275	84	1,359
OXX6	18	13	15	46	5	51
Foreign Engines						
Gipsy	9	22	58	89	35	124
Siemens Halske	13	8	6	27	3	30
Walters	2	4	16	22	4	26
Miscellaneous	5	2	8	15	4	19
Total	1,067	1,443	1,676	4,186	388	4,574

A SORTING OUT of the licensed airplanes by makes and years of production serves a dual purpose. It approximates a revelation of total production figures, minus exports and minus the planes which may already have been eliminated by crash. It furnishes the data, also, and this is more important for a survey of the rate at which airplanes disappear from the active list.

So far as the analysis of recent production is concerned, the figures that are given for the individual makes closely resemble those for licenses issued from April 1, 1929, to March 1, 1930, inclusive, as tabuated on page 569. In only a half dozen instances among the leading makes do the licenses granted in that period differ very materially from the number of licenses now valid on machines built in 1929. In those few cases the licenses issued are materially in excess of the apparent 1929 production, the discrepancy in one instance probably being due to the inclusion of a number of imported planes built abroad during 1928, in the others to the carrying over into 1929 and licensing during that year of airplanes of earlier construction. Of the ten manufacturers having the largest total number of planes licensed, eight were also among the ten largest producers in 1929, so far as these license figures indicate. Of the ten manufacturers taking the largest number of licenses on their 1929 production (up to January 15), seven are also among the ten leaders in licensed machines of 1928 production still on the active list. The other three are comparative newcomers. Of the seven who are among the leaders in both years, five turned out more machines in 1929 than at present stand on their 1928 roster.

Counting all factories under a centralized financial control, such as Curtiss-Wright, United Aircraft, or Detroit Aircraft Corporation, as a single unit, it develops that two companies were responsible for the construction of 40 per cent of the total number of airplanes licensed on January 15, five companies for 56 per cent, and ten companies for 73 per cent. On the basis of 1929 production alone the corresponding figures were 40, 54, and 71 per cent. The apparent slight reduction may have been due to some of the large companies using better judgment than the average of the small ones in slackening off production last fall, but whatever the reason there is no indication in these figures of even the faintest tendency towards the concentration of the entire industry in the hands of half a dozen producers. Of all the automobiles made in the United States, a little more than 80 per cent come from five companies (counting General Motors, for example, as one), and about 94 per cent from ten. The airplane industry is much farther than that from monopoly.

Particularly interesting is the analysis of these data in terms of rate of disappearance of planes, either by crash or by scrapping for obsoleteness. A first clue is given by an examination of the percentages listed at the bottom of the table, showing only 12 per cent of the 1926 production still on the licensed list, while 1927, 1928, and 1929 are all grouped between 41 and 64 per cent. Those figures are distorted, however, by the failure to allow for exports and by the number of machines produced but never licensed, a number which was very considerable in 1926 and 1927. A better index is to be obtained from the curves of valid licenses outstanding on page 560.

In interpreting the curves it will be assumed that the number of licenses issued up to the end of February should represent the end of the previous year's production. Figures need not be given in detail, for they are admittedly quite approximate. For a really thorough study analyses like that contained in the table on this page would be needed for a number of periods. The indication, however, is that the rate of attrition increases very slowly for the first three years of the airplane's life, and that it clings persistently around ten to twelve per cent during that period. If anything, the proportion of loss appears a little higher in the first year than in the second.

Licensed Airplanes by Age and Make

	1915 to 1925, Inclusive	1926	1927	1928	1929	Total	Year of Manufacture Unknown	Total
American Eagle	2	1	21	88	103	215	12	227
Arrow	..	1	1	5	34	41	1	42
Aristocrat	..	..	...	2	20	22	1	23
Avro-Avian	..	..	...	8	35	43	6	49
Bellanca	..	..	2	11	34	47	4	51
Boeing	1	1	18	27	46	93	5	98
Buhl	..	1	10	11	8	30	2	32
Cessna	..	..	...	13	69	82	5	87
Challenger	..	..	9	78	94	181	6	187
Command-Aire	1	..	1	30	129	161	11	172
Curtiss Fledgling	..	..	...	3	85	88	3	91
Curtiss Robin	..	..	...	72	479	551	13	564
Curtiss Miscell	8	..	...	8	13	29	7	36
Eaglerock	..	2	83	227	124	436	9	445
Fairchild	..	1	10	64	56	131	10	141
Fokker	1	2	6	22	70	101	6	107
Ford	1	1	1	20	67	90	4	94
Fleet	..	..	...	1	178	179	...	179
Great Lakes	..	..	...	...	37	37	3	40
International	..	..	8	17	3	28	...	28
Lincoln	1	..	18	35	27	81	5	86
Lockheed	..	..	...	25	35	60	3	63
Loening	..	..	...	5	14	19	3	22
Monocoupe	..	..	1	115	57	173	5	178
Monoprep	..	..	...	4	41	45	1	46
Moth	2	..	1	5	73	81	29	110
New Standard	..	..	1	4	39	44	8	52
Nicholas-Beasley	..	..	...	1	26	27	1	28
Parks	..	..	...	3	43	46	1	47
Pitcairn	..	1	12	26	34	73	2	75
Ryan	..	..	11	90	49	150	2	152
Sikorsky	..	..	3	7	34	44	3	47
Spartan	..	..	1	25	54	80	2	82
Stearman	1	..	7	61	64	133	5	138
Stinson	..	1	15	66	95	177	10	187
Swallow	2	4	28	67	68	169	8	177
Travel Air-Biplane	..	7	87	324	307	725	24	749
Travel Air-Monoplane	..	..	3	11	123	147	2	139
Waco	3	30	169	458	301	961	32	993
Miscellaneous	22	17	15	67	250	371	196	567
	45	70	542	2,106	3,418	6,181	450	6,631
Approximate percentage of commercial production for each year now licensed	..	11.7%	41.7%	59.4%	63.5%	.....	...	.....

Engines Used on Licensed Airplanes of Certain Popular Makes

American Eagle

OX5	127
Wright Whirlwind	12
Hisso	7
Kinner	74
OXX6	6
Miscellaneous	1
	227

Challenger (Fairchild KR)

OX5	124
Wright Whirlwind	45
Curtiss Challenger	1
Comet	6
Kinner	1
OXX6	3
Spartan	1
Scarab	3
Miscellaneous	3
	187

Command-Aire

OX5	100
Wright Whirlwind	6
Curtiss Challenger	28
Axelson	2
Cirrus	1
Cyclone	1
Hess	1
Siemens Halske	5
Scarab	28
	172

Eaglerock

OX5	264
Wright Whirlwind	37
Curtiss Challenger	7
Comet	8
Hisso	98
Kinner	17
Le Blond	1
OXX6	10
Siemens Halske	2
Miscellaneous	1
	445

Fairchild

OX5	2
Wright Whirlwind	71
Curtiss Challenger	1
Wasp	65
Hornet	2
	141

Fokker

Wright Whirlwind	16
Wasp	88
Cyclone	3
	107

Ford

Wright Whirlwind	34
Wasp	60
	94

Fleet

Wright Whirlwind	2
Curtiss Challenger	1
Brownback	1
Kinner	99
Scarab	76
	179

Monocoupe & Monoprep

OX5	1
Wright Whirlwind	15
Axelson	1
Comet	1
Kinner	5
Siemens Halske	1
Velie	193
Scarab	4
Miscellaneous	3
	224

Moth

Wright Whirlwind	1
Cirrus	3
Gipsy	93
Miscellaneous	13
	110

Robin

OX5	313
Wright Whirlwind	37
Curtiss Challenger	209
Hisso	1
Kinner	1
OXX6	1
Scarab	1
Miscellaneous	2
	564

Ryan

OX5	2
Wright Whirlwind	141
Wasp	2
Hisso	6
Miscellaneous	1
	152

Stearman

OX5	3
Wright Whirlwind	122
Comet	1
Cyclone	2
Hisso	2
Hornet	5
Siemens Halske	2
Miscellaneous	1
	138

Stinson

OX5	1
Wright Whirlwind	147
Wasp	6
Szekeley	2
Lycoming	1
Scarab	29
Miscellaneous	1
	187

Swallow

OX5	133
Wright Whirlwind	14
Hisso	6
Kinner	14
OXX6	9
Scarab	1
	177

Travel Air

OX5	474
Wright Whirlwind	274
Curtiss Challenger	7
Wasp	14
Axelson	8
Hisso	33
Kinner	6
OXX6	36
Siemens Halske	5
Velie	1
Scarab	27
Miscellaneous	3
	888

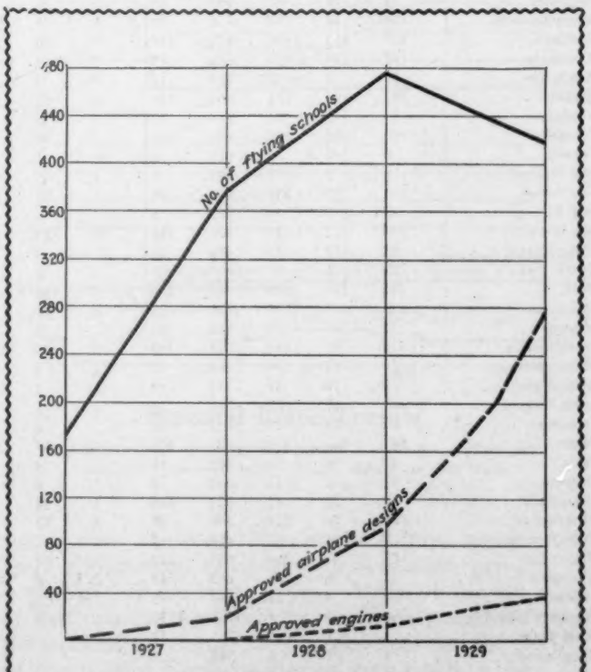
Waco

OX5	744
Wright Whirlwind	151
Curtiss Challenger	1
Hisso	37
Kinner	1
OXX6	29
Siemens Halske	22
Scarab	2
Miscellaneous	6
	993

THE ONCE ubiquitous OX5 still accounts for a majority of the licensed open three-passenger planes. Of the eight machines of that class included in the table at the top of the page, seven show a clear majority for the OX5. In two cases, the figure runs to over 80 per cent war surplus engines on the machines still in service.

Aside from showing the status of the war engines, the most striking feature of the tabulation is its diversity. Leaving the Ford and Fokker out of consideration and examining only the single-engined machines of moderate size, only one or two of the remaining fifteen makers show any close approach to standardization. In one case seven makes of engines each come in for over one per cent of the planes licensed by a given maker, the war-time engines being thrown out of the reckoning entirely, while in several instances the corresponding figure was from three to five.

THE CURVES at the right show the steady acceleration in the rate of granting approved type certificates, both for planes and for engines. No detailed analysis of the trends as shown in the machines receiving certificates, such as was given in the first statistical issue, is being attempted this time. A very full study, bringing that of the October 5th issue up to the end of 1929, was made in Leslie E. Neville's article, "The Trend of Design in 1929," in AVIATION for February 15th.



Approved Type Certificates and Flying Schools.

Notes on Distribution

As the Department of Commerce and Chamber of Commerce do not collect for public circulation any data on the merchandising of airplanes, a questionnaire pertaining to merchandising methods was forwarded to all manufacturers. Returns were received from companies representing about 20 to 25 per cent of America's total production of commercial aircraft.

In their distribution for the coming year, the companies reporting planned to make very little use of direct factory representatives selling planes to the ultimate consumer. That is particularly true of the types generally sold to individuals or to small business organizations. Transport planes are, of course, in an entirely special category, and are distributed almost entirely by direct sale from the factory. Confining attention to machines selling at under $20,000, there is approximately an equal division of favor between dependence upon dealers communicating directly with the factory and dependence upon distributors who, in turn, will appoint dealers in their territory and take the responsibility for their activities.

If the large mergers, having a miscellany of aircraft products to dispose of and working through a centralized sales organization, be eliminated from consideration, a majority of the more important manufacturers are planning to keep the dealer directly in touch with the factory and eliminate the distributor as intermediary. At least two of the leading manufacturers are adopting that practice for the first time in 1930, after having used distributors in the past.

To a question pertaining to national versus localized distribution, all of the manufacturers except two very small ones declared against local concentration of sales efforts, and in favor of a nationally uniform distribution.

Of last year's output as reported, again eliminating the transport planes, approximately 84 per cent was disposed of through distributors and dealers under their control, 6 per cent through dealers operating in direct liaison with the factory, 4 per cent through factory representatives in the field, and 6 per cent by direct factory sales. The indication is strong, however, that for the coming year the second of these figures will show pronounced gain at the expense of the first.

Only four manufacturers were able to give detailed information on the classification of dealers in terms of the number of planes of which they disposed. Those four, of whom three are making planes priced at from $3,000 to $6,000, while the fourth comes in the $10,000 class, reported approximately 100 dealers. Of that number only 4 per cent had disposed of more than 20 planes each during the year. Seven per cent had sold from eleven to twenty planes, nine per cent from six to ten, 24 per cent from three to five, and 56 per cent had moved two planes or less. Approximately 75 per cent of all the dealers upon whom reports were made had done a gross business of less than $25,000, with a presumed gross income, on the usual commission basis, of less than $6,000.

Approximately 75 per cent of the manufacturers reporting make it a practice to require a contract for a definite yearly quota from their distributors and dealers, and demand a deposit of some sort on the projected amount of business.

As between open and closed dealer territory, there was almost an even division of opinion, but among the most important of the independents not associated with any merger the open ter-

Aircraft and Pilots

(Jan. 1, 1930)

	Licensed	Identified	Total	Proportion of total aircraft licensed	Transport	Industrial	Limited commercial	Private	Total	Ratio of pilots to aircraft
Alabama	18	10	28	.643	39	1	5	6	51	1.82
Arizona	23	10	33	.696	20	...	8	21	49	1.48
Arkansas	43	21	64	.671	35	4	7	44	90	1.91
California	832	390	1,222	.680	903	18	179	976	2,076	1.70
Colorado	60	17	77	.779	49	...	9	43	101	1.31
Connecticut	86	21	107	.803	34	1	13	47	95	0.89
Delaware	34	1	35	.971	6	...	2	8	16	0.46
Dist. of Columbia	59	3	62	.952	190	1	8	59	258	4.16
Florida	52	48	100	.520	90	...	19	59	168	1.68
Georgia	26	40	66	.393	31	...	8	20	59	0.89
Idaho	15	7	22	.681	15	...	2	2	19	0.86
Illinois	454	243	697	.651	266	6	119	246	637	0.91
Indiana	141	101	242	.583	94	1	33	88	216	0.89
Iowa	85	74	159	.535	57	...	41	80	178	1.12
Kansas	251	141	392	.641	98	2	36	82	218	0.58
Kentucky	28	10	38	.736	24	...	15	15	54	1.42
Louisiana	64	25	89	.718	36	2	4	20	62	0.70
Maine	7	10	17	.412	7	...	6	16	29	1.71
Maryland	71	26	97	.732	49	2	16	51	118	1.22
Massachusetts	180	58	238	.756	14	1	7	48	70	0.29
Michigan	323	153	476	.676	218	1	70	200	489	1.03
Minnesota	117	74	191	.612	78	1	44	78	201	1.05
Mississippi	20	3	23	.869	13	1	5	25	44	1.91
Missouri	382	190	572	.668	146	6	83	106	341	0.60
Montana	31	43	74	.419	25	...	6	18	49	0.66
Nebraska	102	140	242	.421	61	...	30	64	155	0.64
Nevada	5	3	8	.625	4	1	1	5	11	1.38
New Hampshire	16	3	19	.842	8	...	5	10	23	1.21
New Jersey	160	93	253	.631	69	1	30	120	220	0.87
New Mexico	13	5	18	.722	8	...	3	7	18	1.00
New York	977	212	1,189	.822	346	13	135	513	1,007	0.85
North Carolina	35	37	72	486	27	..	3	28	58	0 81
North Dakota	27	32	59	.457	15	...	9	18	42	0.71
Ohio	392	214	606	.482	220	2	106	194	522	0.86
Oklahoma	236	101	337	.700	120	7	51	121	299	0.89
Oregon	55	63	118	.516	41	...	15	23	79	0.67
Pennsylvania	378	85	463	.816	189	13	91	207	500	1.08
Rhode Island	24	10	34	.704	12	...	4	19	35	1.03
South Carolina	19	18	37	.513	14	...	2	5	21	0.57
South Dakota	53	19	72	.736	33	1	13	32	79	1.10
Tennessee	61	24	85	.715	37	...	6	45	88	1.03
Texas	269	164	433	.621	331	10	57	187	585	1.35
Utah	25	6	31	.807	19	...	14	15	48	1.55
Vermont	11	2	13	.846	7	1	6	6	20	1.54
Virginia	38	23	61	.623	146	1	23	21	191	3.13
Washington	168	56	224	.750	99	3	37	51	190	0.85
West Virginia	15	16	31	.484	12	...	...	17	29	0.94
Wisconsin	175	94	269	.651	70	1	50	78	199	0.74
Wyoming	12	6	18	.667	15	...	6	4	25	1.39
Alaska	8	4	12	.667	5	1	...	1	7	0.58
Hawaiian Islands	6	2	8	.750	36	...	1	2	39	4.88
Canal Zone	...	1	1	0	17	...	...	2	19	19.00
Miscellaneous	3	3	6	.500	9	...	...	9	18	.....
Totals	6,685	3,155	9,840	.680	4,507	103	1,443	4,162	10,215	1.04

For discussion see page 566

ritory had a clear preponderance. As these terms are used in varying senses, the questionnaire carried the explanatory note that "closed territory implies that in the event of any sales made from within that territory, through any channel, the distributor or dealer will still receive at least a substantial portion of his normal commission, being guaranteed against the incursion of all the dealers or of factory representatives." Presumably, it was in that sense that the answers were returned.

On the question of co-operative advertising, the manufacturers contributing to the dealers advertising campaigns, there was again almost an even division of opinion, with a slight margin in favor of such a plan.

Discounts, as might have been expected, showed relatively little variation. On the whole, the companies doing the largest business, and that most nearly uniform in territorial distribution over the country, allow the most liberal discounts. The actual figures quoted range from 20 to 25 per cent for distributors, and from 15 to 25 per cent for dealers operating directly with the factory.

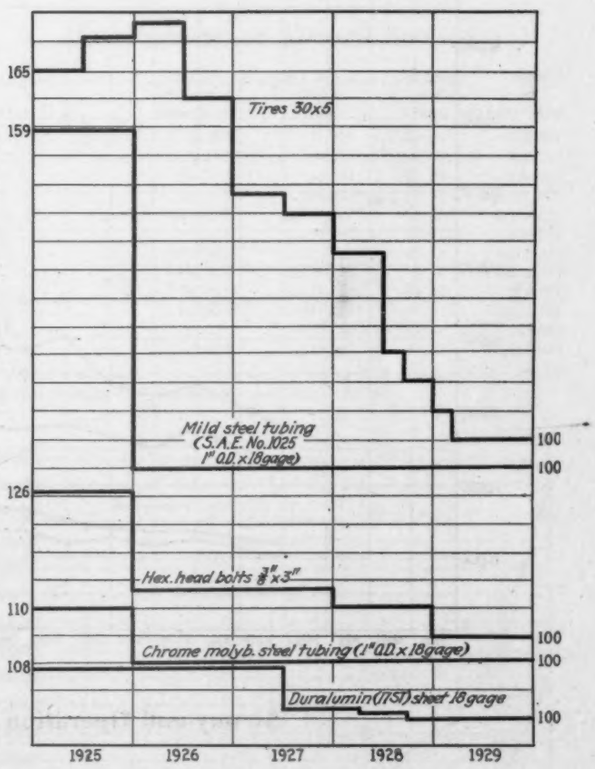
Except for the larger holding companies, which have facilities for virtually operating their own finance corporations, a majority of the manufacturers do not provide any time payment plan. A few allow time payments on demonstrators to the distributors and dealers, however, while a few others make a financing arrangement under their own supervision general in application both for retail and wholesale distribution.

MATERIALS

BY WAY OF indicating the trend of prices of certain raw materials and parts important in the fabrication of aircraft, inquiries have been made from a number of manufacturers and supply houses. The results are plotted herewith. A number of manufacturers were willing to furnish actual prices for use in making up a trend chart, but did not wish that the actual wholesale prices be published. All the curves have been plotted in terms of percentage changes, taking the present price as the base and as 100 in each case. Each vertical division on the chart represents five per cent of the present price, and the curves have been spread out arbitrarily to avoid confusion and overlapping. The prices at the beginning of 1925, on a scale of 100 for the price level five years later, are marked in at the left-hand end of each curve. For the data upon which the curves are based we are indebted to the Summerill Tubing Company, the Aluminum Company of America, the Aero Supply Manufacturing Company, the Goodyear Tire & Rubber Company, and the U. S. Rubber Company.

The specific article upon which prices were requested is defined upon the curve in each instance. Sizes and gages of extensive aeronautical use were selected, and the prices sought were those which would have to be paid by a manufacturer of airplanes buying in large quantities.

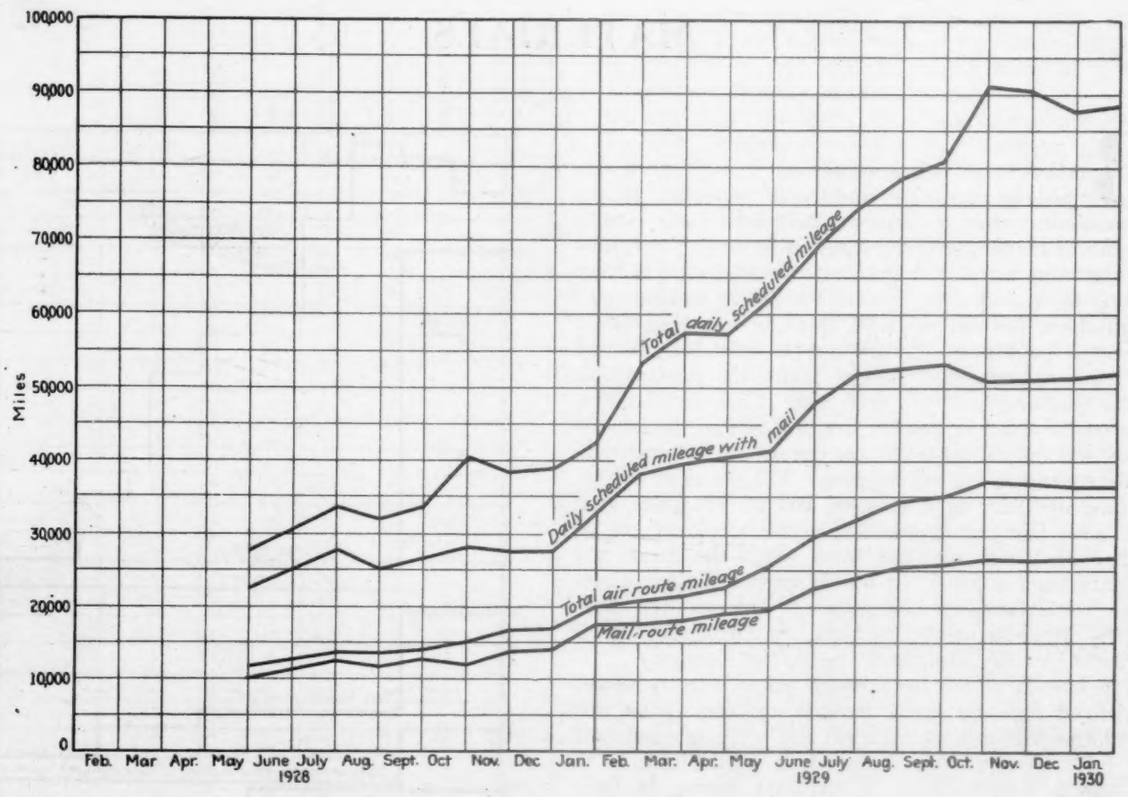
To those who have not followed the price trend directly, it will be an occasion for some surprise that the reduction has been much more marked on mild steel tubing, which was a product of extensive industrial employment outside of aircraft factories, than upon chrome molybdenum tubing, the development of which was fostered almost purely on behalf of its aeronautical applications. The two most important metallic materials, in fact, chrome molybdenum tubing and sheet duralumin, both show very modest reductions of less than ten per cent in the last five years. Parts which are made up solely for aeronautical purposes naturally are more affected than the raw materials, and the price of tires, after a brief period of oscillation close to the 1925 figure, has dropped more than 35 per cent in three years. Airplane hardware, as symbolized by a specified size of hex-head bolts made to AN standard, has come down 20 per cent in four years. Between 1922 and 1924 there was a much more abrupt drop, amounting to over sixty per cent in some cases, in hardware prices. Much of the reduction in that material has been the result of standardization, the work of the Army-Navy conferences and the Society of Automotive Engineers having very much reduced the number of sizes and types of parts that have to be carried in stock, with corresponding savings both in production and in distribution costs.



Material Price Trends

Each vertical division represents a change of five per cent, the present price being taken as the base

UNITED STATES *Air Mail* AND *Passenger T*

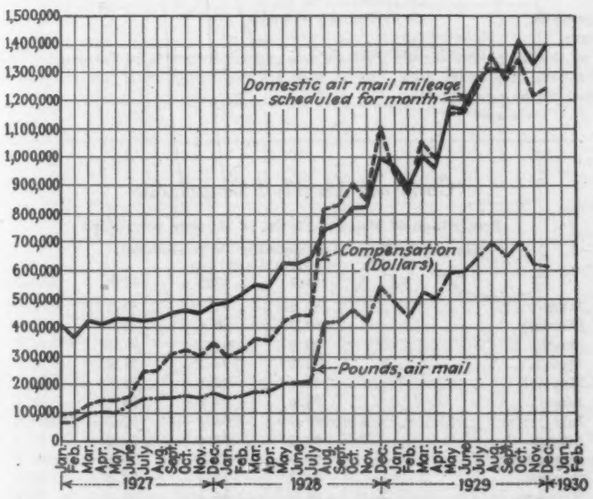


Airway and Operation Mileage for Last 19 Months

	Miles of Mail Airways	Total Miles of Airways	Airplane Miles Scheduled Daily with Mails	Total Airplane Miles Scheduled Daily
May 30, 1928	10,058	11,067	22,448	27,493
July 31, 1928	12,171	13,108	27,660	33,317
Aug. 31, 1928	11,921	13,133	25,288	32,042
Sept. 30, 1928	12,937	13,609	26,240	33,792
Oct. 31, 1928	12,397	14,941	28,204	40,602
Nov. 30, 1928	13,974	16,486	27,606	38,902
Dec. 31, 1928	14,155	16,667	27,848	39,060
Jan. 31, 1929	17,470	19,888	32,816	42,698
Feb. 28, 1929	17,470	20,788	38,045	53,345
Mar. 31, 1929	18,074	21,392	39,216	57,516
Apr. 30, 1929	19,022	22,778	40,472	57,453
May 31, 1929	19,721	25,336	41,929	62,265
June 30, 1929	22,165	29,227	48,068	69,029
July 31, 1929	24,088	32,196	52,070	74,970
Aug. 31, 1929	25,530	34,366	52,871	78,721
Sept. 30, 1929	25,735	35,198	53,369	80,691
Oct. 31, 1929	26,567	37,037	50,843	91,162
Nov. 30, 1929	26,597	36,957	51,230	90,436
Dec. 31, 1929	26,597	36,330	51,230	87,684
Jan. 1, 1930	26,657	36,510	51,844	88,211
Feb. 1, 1930	26,657	36,510	51,844	88,211
Mar. 1, 1930	26,657	36,982	51,844	89,549

er Transport

EXCEPT for a sharp increase in daily passenger-mileage last October, at the time when rate reductions were just beginning to be made and when the winter resort traffic was just opening up, route mileages and total distances scheduled for flight have remained almost static for the past seven months. December and January are months of natural recession, due to natural reduction of passenger travel in the northern states. The seasonal effect was hardly felt a year ago, since it synchronized with the beginning of the financial boom

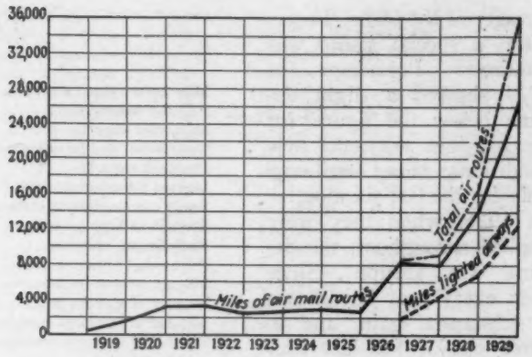


Air Mail History by Months

that opened new passenger routes and doubled and tripled the schedules all over the country. This year it has manifested itself in its natural form.

Apparent discrepancies between the chart on the lower right-hand corner of this page, with its corresponding table, and the graph and data on the opposite page are accounted for by the inclusion in the latter chart of the foreign air mail routes under American control. Within the year 1929 the miles of mail airways were almost doubled, but most of the increase was outside the territory of the United States.

The graph in the left-hand column shows the scope of the domestic air mail service to have expanded steadily since contract operation was started in 1926. There



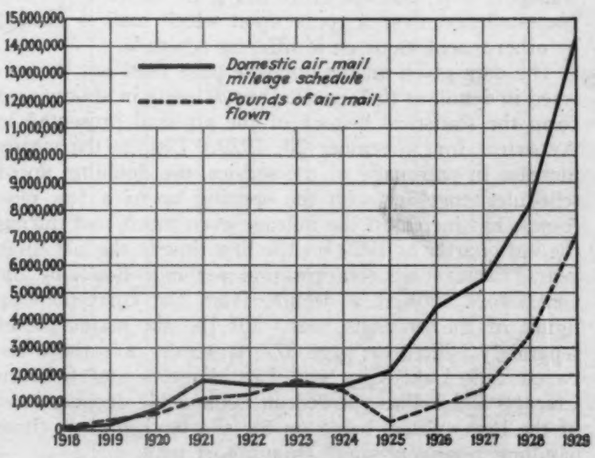
Miles of U. S. Mail Airways

Dec. 31, 1918.....	218	Dec. 31, 1924.....	3,010
Dec. 31, 1919.....	930	Dec. 31, 1925.....	2,813
Dec. 31, 1920.....	3,509	Dec. 31, 1926.....	8,410
Dec. 31, 1921.....	3,509	Dec. 31, 1927.....	8,223
Dec. 31, 1922.....	2,738	Dec. 31, 1928.....	14,155
Dec. 31, 1923.....	2,842	Dec. 31, 1929.....	26,597

Development of Airmail Service

Year	Air Mail Mileage Scheduled	Air Mail Mileage Flown	Per Cent of Schedule Flown	Pounds of Air Mail
1918	18,000	16,009	88.94	17,831
1919	166,843	160,066	95.92	230,251
1920	653,764	549,244	84.00	526,573
1921	1,819,978	1,554,985	85.45	1,120,852
1922	1,629,250	1,537,927	94.41	1,224,723
1923	1,644,457	1,590,637	96.71	1,696,896
1924	1,590,425	1,522,763	95.12	1,500,034
1925	2,160,022	2,076,764	96.15	*232,513
1926	4,447,011	4,133,478	92.93	850,931
1927	5,541,971	5,041,659	90.97	1,452,426
1928	8,201,036	7,673,786	93.56	3,542,074
1929	14,217,887	13,052,507	91.80	7,100,027

*Only specially paid air mail was carried during 1925 and thereafter. Up to that time ordinary first-class mail had been carried by air.



Domestic Air Mail—Air Mileage and Traffic

has also been steady and accelerating increase in patronage from the time when the public had a chance of determining the patronage for itself. Until July 1, 1924, the amount of mail carried was governed by the arbitrary decision of the Post Office Department, which loaded in ordinary first-class mail matter to the

capacity of the plane. Thereafter, a special stamp was required. Poundage for 1924 showed a slight decline below the figure for the previous year, the new conditions being enforced only for the last six months. In 1925, when they were applied throughout, the decline was abrupt. Since then every year has shown a substantial gain, and in three out of the last four years, including both 1928 and 1929, the gain has been over one hundred per cent.

The growing importance of passenger transport is shown both in the gradual divergence between the upper two curves of the large graph on page 574 and in the small chart of route mileage ratio on page

As late as the fall of 1928 mail was carried on 90 per cent of the air route mileage of the United States. The proportion has now declined to less than three-quarters. Of the total airplane miles to be flown daily, more than 80 per cent were flown with mail until the end of July, 1928. Fifteen months later the ratio had fallen to less than 60 per cent. These figures are of course smaller than the route mileage ratio plotted on page 578 since individual airplanes may be flown for passenger transport only, and therefore not count as mail-carrying plane-mileage, over a route upon which mail is carried by other machines or on a different schedule.

The data given on the opposite page need not be analyzed in detail, as they parallel very closely in abbreviated form the statistical history of the air mail presented in AVIATION for November 23, 1929. Despite the steady increase in patronage of the service, the doubling up of schedules, together with the opening up of a few new routes, has increased the mileage even more, and during the last quarter of 1929 for the first time in the last three years, the average compensation per mile flown by the contractors showed a decline from the corresponding figure of the previous year. Of the six major routes separately plotted on page 577, however, only those between Salt Lake City and Los Angeles and between Chicago and Dallas showed an appreciable decline, most of the heavy losses being on the shorter routes or those handling relatively small amounts of mail.

One of the disturbing influences for the last quarter of 1929 was the unprecedentedly foggy weather over the greater part of the country, which gave the air mail, as shown by the curve in the lower right-hand corner, an abnormally low record of reliability in October, and especially in December. With the exception of that last quarter the reliability records have remained amazingly true to the average seasonal curve throughout the last three years.

Civil Aviation in the United States

	1926	1927	1928	1929	1930
Mileage of lighted airways	2,041	4,468	6,988	12,448	.....
Under construction	1,108	1,277	2,314	1,352	.....
Municipal airports	.....	240	368	453	.....
Commercial and private airports	.....	263	365	495	.....
Proposed airports	.....	422	921	1,413	.....
Lighted intermediate fields	92	134	210	285	.....
Radio communication stations	17	19	29	34	.....
Electric and gas beacons	612	760	1,188	1,311	.....
Radiobeacon stations	.....	.....	2	9	.....
Private light beacons	.....	8	54	114	.....
Mileage of commercial airways in operation	8,404	9,122	16,667	36,000	.....
Number of airways in operation	18(4)	22	47	65	.....
Number of transport operators	18(4)	19	37	35	.....
Number of planes in transport service	69	128	325	525(1)	.....
Value of above	.....	$1,838,462(2)	$7,000,000(1)	$12,000,000(1)	.....
Number of pilots employed	.....	107	308(3)	500(1)	.....
Airplane miles flown, all operators	4,318,087	5,870,489	10,673,450	22,000,000(1)	.....
Passengers carried on transport lines	5,782	8,679	49,713	150,000(1)	.....
Total value of all air products	$17,694,905	$1,903,583	$3,664,723	$9,202,385	.....
Number of concerns engaged in air industry	600	900	1,400	1,500(1)	.....
Approved airplanes	.....	21	96	279	.....
Approved engines	.....	.....	13	35	.....
Flying schools	175	375	475	419	.....
States with regulatory legislation	7	13	18	20	.....
States with "uniform state law" only	9	10	10	19	.....
States with miscellaneous legislation	3	3	3	1	.....
States with no legislation	29	22	17	8	.....

	Fiscal Years				
	1927	1928	1929	1930	1931
		(Thousands omitted from appropriations)			
Appropriation for aircraft	.....	700	886	958	1,261
Appropriation for airways, Dept. of Commerce	.....	3,091	4,548	5,459	7,944
Total appropriation for Aeronautics Branch Dept of Commerce	550	3,791	5,434	6,417	9,205
Number of aircraft inspectors	.....	.....	50	52	81(5)

(1) Estimate.
(2) Reports from 20 of the 22 operators.
(3) Reports from 33 of 35 operators.
(4) Includes Post Office.
(5) Preliminary estimate.

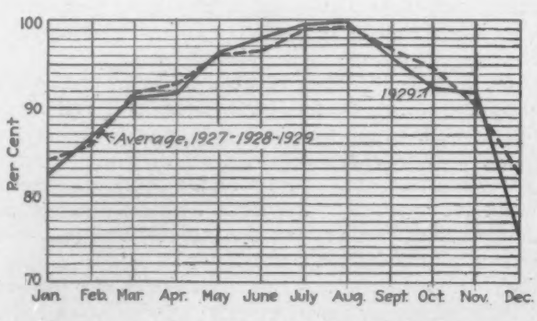
Note: A few of the items listed on this table differ slightly from the data graphically presented elsewhere in this issue, the graphs having been drawn from preliminary data. In no cases are the indications of major trends as shown by the graphs seriously modified by the corrected data.

Contract Air Mail Regularity

Percentage of Mileage Flown of Mileage Scheduled
(Government-Operated Services Not Included)

	1927	1928	1929	Average
January	82.6	81.2	82.3	82.0*
February	84.0	86.4	86.5	85.6
March	90.8	93.2	91.2	91.7
April	92.2	94.2	91.6	92.7
May	94.6	97.3	96.3	96.1
June	96.6	94.8	98.1	96.5
July	99.1	98.3	99.5	99.0
August	99.2	98.8	99.7	99.2
September	97.8	97.0	95.9	96.9
October	96.3	95.1	92.3	94.6
November	90.5	88.4	91.9	90.3
December	82.8	89.6	75.3	82.6

*Plotted incorrectly on chart below.

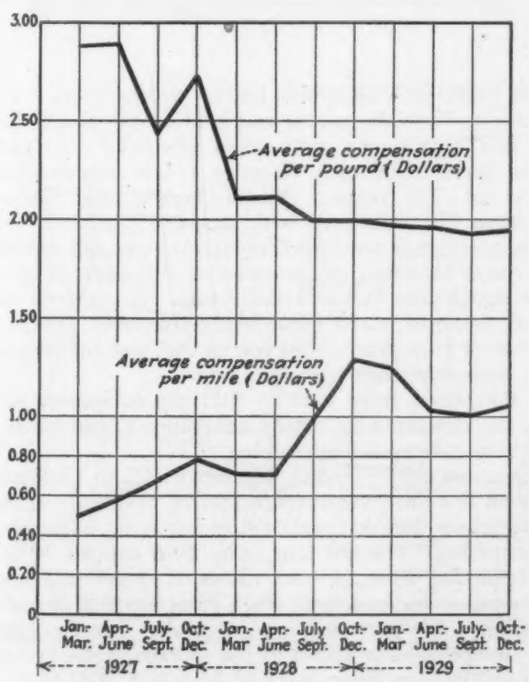


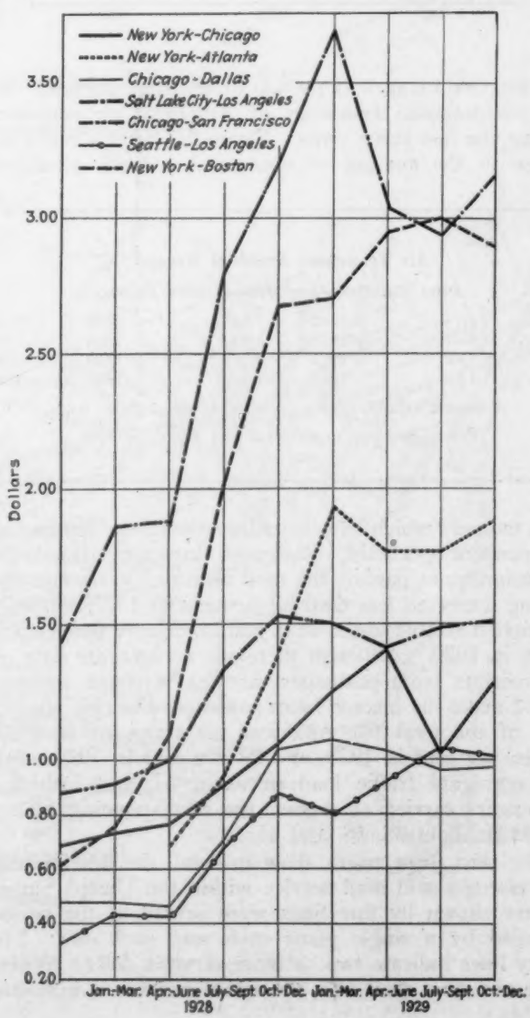
Domestic Contract Air Mail Reliability

Mail Carried by Routes for 1929

Route No.	Termini	Frequency (Rd. Trips) per Month Scheduled)	Miles of Service — Scheduled	Miles of Service — Actually Flown	Per Cent of Scheduled Mileage Flown	Total Weight of Mails Dispatched (Pounds)	Average Weight per Scheduled Trip	Amount Paid to Contractor	Average Compensation per Mile Flown	Contractor
1.	Boston–New York	306	134,792	118,177	87.7	116,095	190	$348,238.74	$2.95	Colonial
2.	Chicago–St. Louis	610	339,716	317,853	93.5	78,077	64	197,610.71	0.62	Universal
3.	Chicago–Dallas	730	1,310,875	1,157,341	88.3	391,407	268	1,174,141.97	1.01	National
4.	Salt Lake City–Los Angeles	574	745,499	717,617	96.3	757,685	658	2,272,976.80	3.17	Western Air E.
5.	Salt Lake City–Pasco	473	513,706	462,679	90.1	236,083	250	706,399.40	1.52	Varney
8.	Seattle–Los Angeles (a)	365	783,439	759,687	97.0	253,437	347	721,456.22	0.95	Pacific Air T.
9.	Chicago–Minneapolis	882	762,107	694,182	91.1	179,376	167	493,109.95	0.71	Northwest
11.	Cleveland–Pittsburgh	591	156,208	139,432	89.2	97,027	82	290,951.34	2.07	Ball
12.	Cheyenne–Pueblo	365	158,746	152,475	96.0	98,828	135	82,027.69	0.54	Western Air E.
16.	Cleveland–Louisville	533	388,081	343,757	84.6	95,840	90	116,872.53	0.48	Universal
17.	New York–Chicago	730	1,346,323	1,187,817	88.2	1,618,287	1,170	1,350,444.10	1.14	National
18.	Chicago–San Francisco	663½	2,601,407	2,475,298	95.2	1,797,506	1,355	3,661.515,40	1.41	Boeing
19.	New York–Atlanta	346	630,454	558,734	88.6	341,590	493	1,024,777.27	1.83	Pitcairn
20.	Cleveland–Albany	313	355,844	317,316	89.2	103,083	163	113,296.84	0.36	Colonial West
21.	Dallas–Galveston	365	237,920	230,123	96.7	45,394	62	131,186.84	0.57	Southern A. T.
22.	Dallas–Laredo	365	376,639	365,262	97.0	83,671	115	241,763.96	0.66	Southern A. T.
23.	Atlanta–New Orleans	346	343,926	319,488	92.9	86,610	125	151,516.01	0.47	Southern A. T.
24.	Chicago–Cincinnati	688	398,049	347,064	87.2	79,364	57	116,600.17	0.34	Embry-Riddle
25.	Atlanta–Miami	331	482,473	454,406	94.1	121,333	183	177,125.09	0.39	Pitcairn
26.	Great Falls–Salt Lake City	365	437,267	407,878	93.3	69,373	95	171,659.92	0.42	National Park
27.	Bay City–Chicago	354	547,212	461,409	84.3	173,232	244	154,102.66	0.33	Thompson
28.	St. Louis–Omaha	337	273,333	245,472	89.8	65,279	97	51,197.31	0.21	Universal
29.	New Orleans–Houston	328	210,461	204,417	97.2	42,146	64	42,146.80	0.21	Southern A. T.
30.	Chicago–Atlanta	365	565,919	520,077	91.9	98,067	134	76,491.61	0.15	Interstate
31.	Chicago–Grant Park Ramp, Chicago	107	963	756	78.5	19,328	90	1,245.00	1.64	Curtiss
32.	Pasco–Seattle	108	116,530	93,790	80.5	52,909	245	4,759.82	0.50	Varney
	Total	11,540½	14,217,887	13,052,507	92.7	7,100,027	308	$13,873,614.15	$1.06	

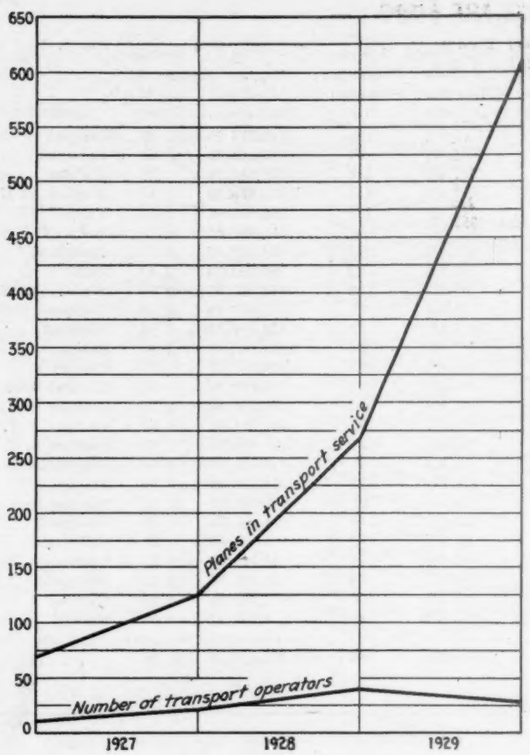
(a) Southbound trip not operated from Seattle to Portland.

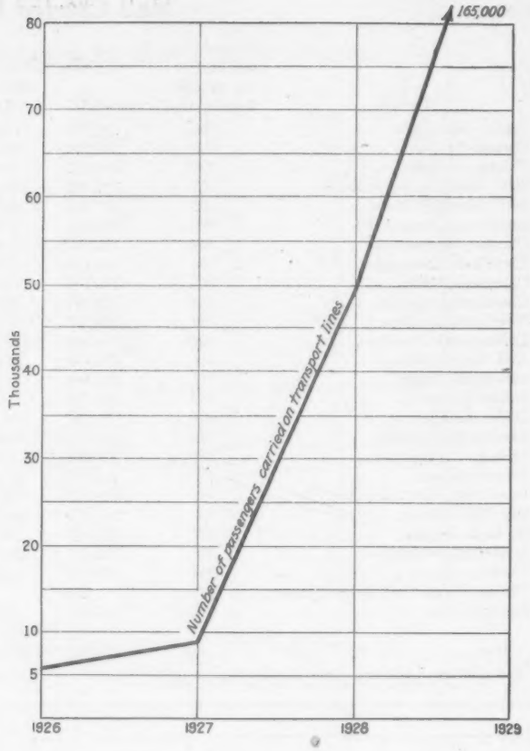




Above: The financial history of the contract domestic air mail.

At right: The compensation, in dollars per mile flown, of some of the individual contract routes.





THE TWO CHARTS at the top of the page illustrate the predominant tendencies of American air transport during the last three years. There has been a rapid increase in the amount of equipment carried, combined with mergers which have actually reduced the number of independent operators. Passenger transport, after being an insignificant part of the total until two years ago and having increased less than 50 per cent in 1927, suddenly multiplied sixfold in the next year, and more than tripled again in 1929. Although there are no accurate data on the receipts from passenger carrying, a rough estimate would make the income from passenger business ten per cent of the total for American air transport in 1927, fifteen per cent in 1928, and 22 per cent in 1929. For the aggregate traffic load in ton-miles, and including passengers carried on passes, the corresponding figures would be about 38, 58, and 65.

Air Transport Accident Record

Pilot Fatalities per Million Miles Flown

1918	9.75	1922	0.57	1926	0.88
1919	8.67	1923	2.65	1927	1.24
1920	7.62	1924	1.38	1928	0.84
1921	3.66	1925	0.40	1929	1.08

Average, 1922-5, 1.49 **Average, 1926-9, 0.93**

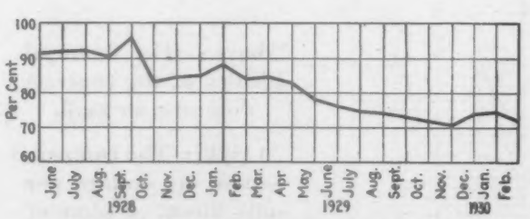
For passenger hazard records see page 605

The next three pages show in detail the development of passenger and mail service within the United States. Routes shown by fine lines were served at the period specified by a single plane each way each day. The heavy lines indicate two or more services daily. Where there are more than two, the actual number is indicated on the map, with an arrow leading to the route. On January 1, 1930, the record was held by the San Francisco-Los Angeles run, with seven scheduled daily passenger services in each direction. Los Angeles-San Diego (or Tia Juana), Miami-Havana, and Tulsa-Oklahoma City came next with six each.

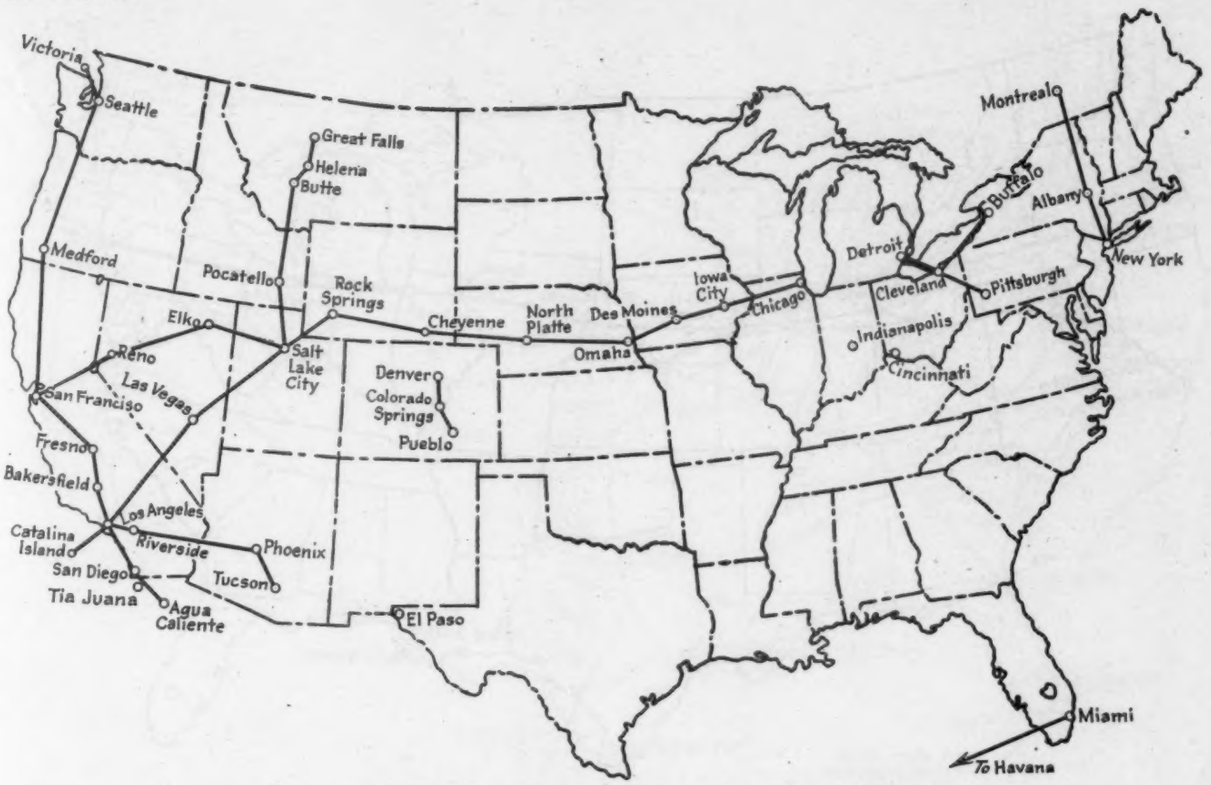
The coverage is not broad enough to make the records of accident fatalities, as presented on this page, of very much significance for individual years. A curve of the annual averages would be violently irregular. Periods of three or four years, however, smooth out the irregularity enough to show a definite trend.

In the period from 1918 to 1921 the equipment was unfit, the airways were totally unorganized, and fatality rates were correspondingly high.

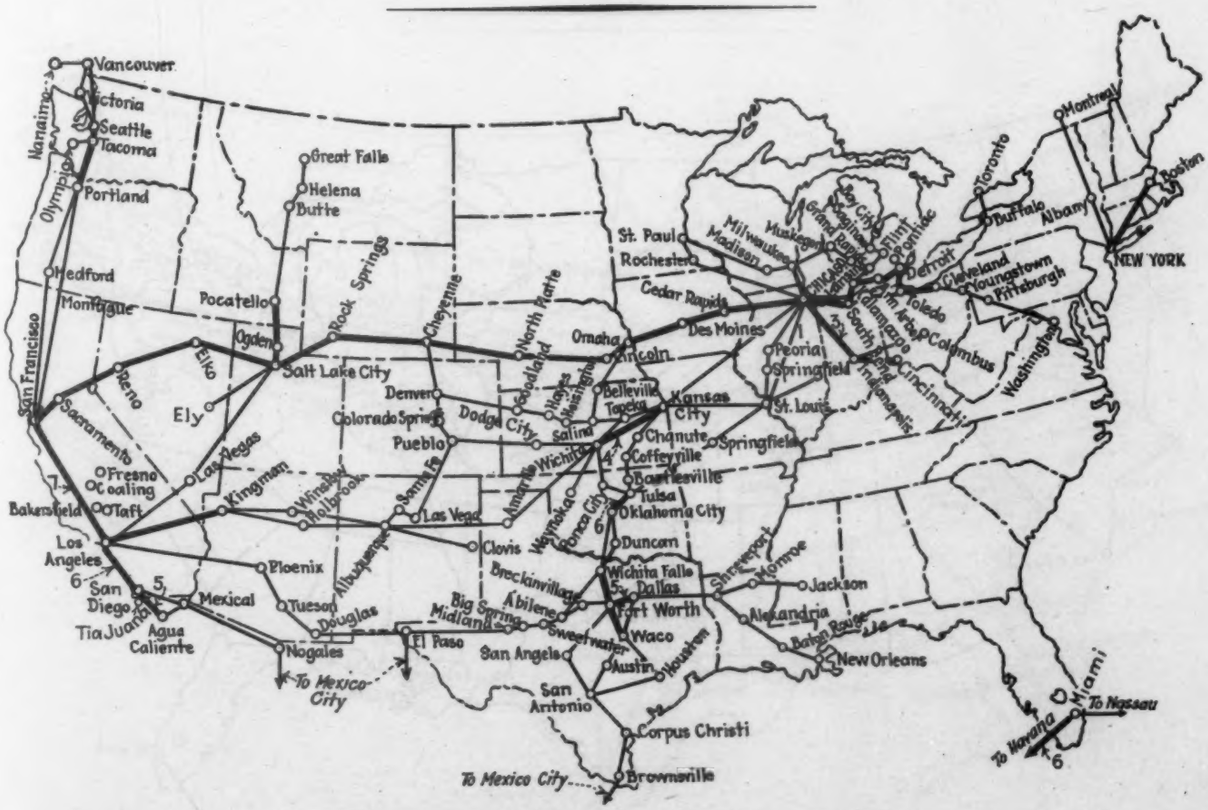
The average pilot fatality rate from 1922 to 1925 was less than one-third the average for the first four years, in spite of the fact that night flying was being introduced in that period. The last four years show another 40 per cent reduction, although some routes of exceptional difficulty were opened and there was a great increase of night operation. The percentages of regularity for the same four-year periods, as shown by the average proportion of scheduled mileage flown, were 85.7, 95.6, and 92.3.



Percentage of total route mileage on which mail is carried.



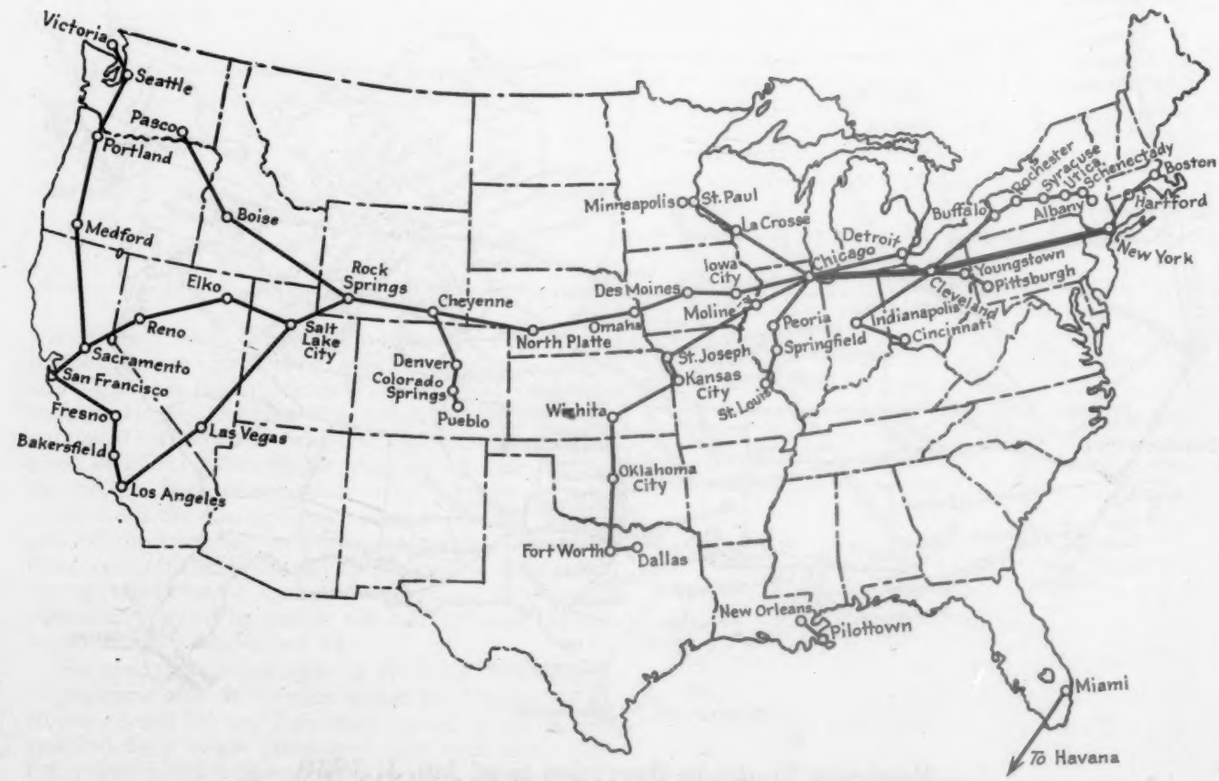
Passenger Routes in Operation as of Jan. 1, 1928



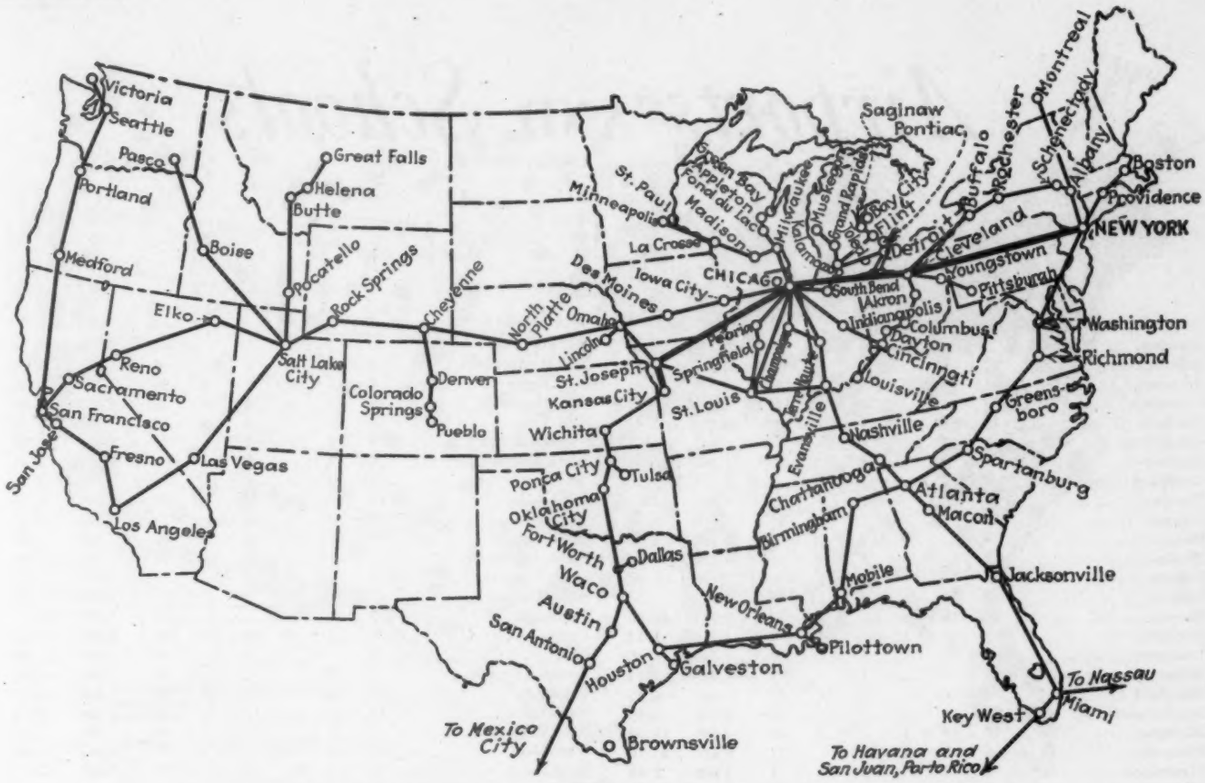
Passenger Routes in Operation as of Jan. 1, 1930

For explanation, see text on page 578

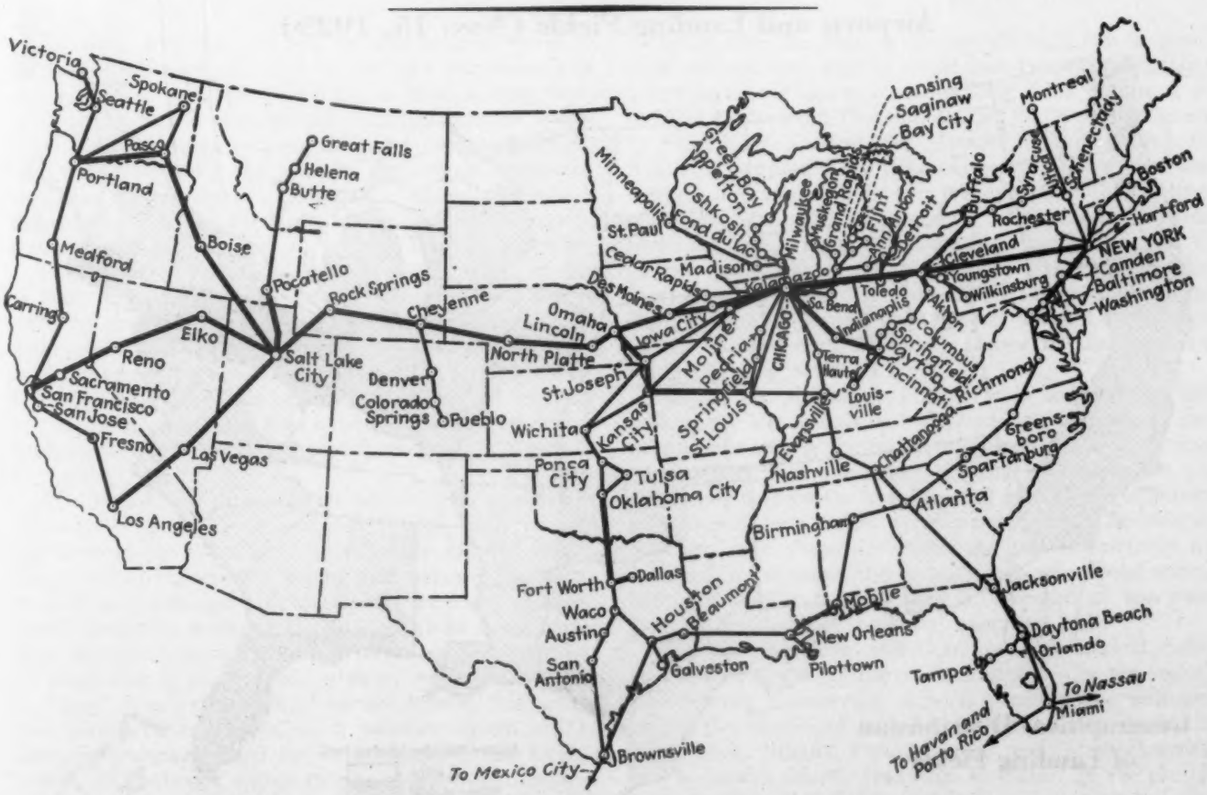
Domestic Air Mail Routes in Operation as of Jan. 1, 1926



Domestic Air Mail Routes in Operation as of Jan. 1, 1928



Domestic Air Mail Routes in Operation as of Jan. 1, 1929



Domestic Air Mail Routes in Operation as of Jan. 1, 1930

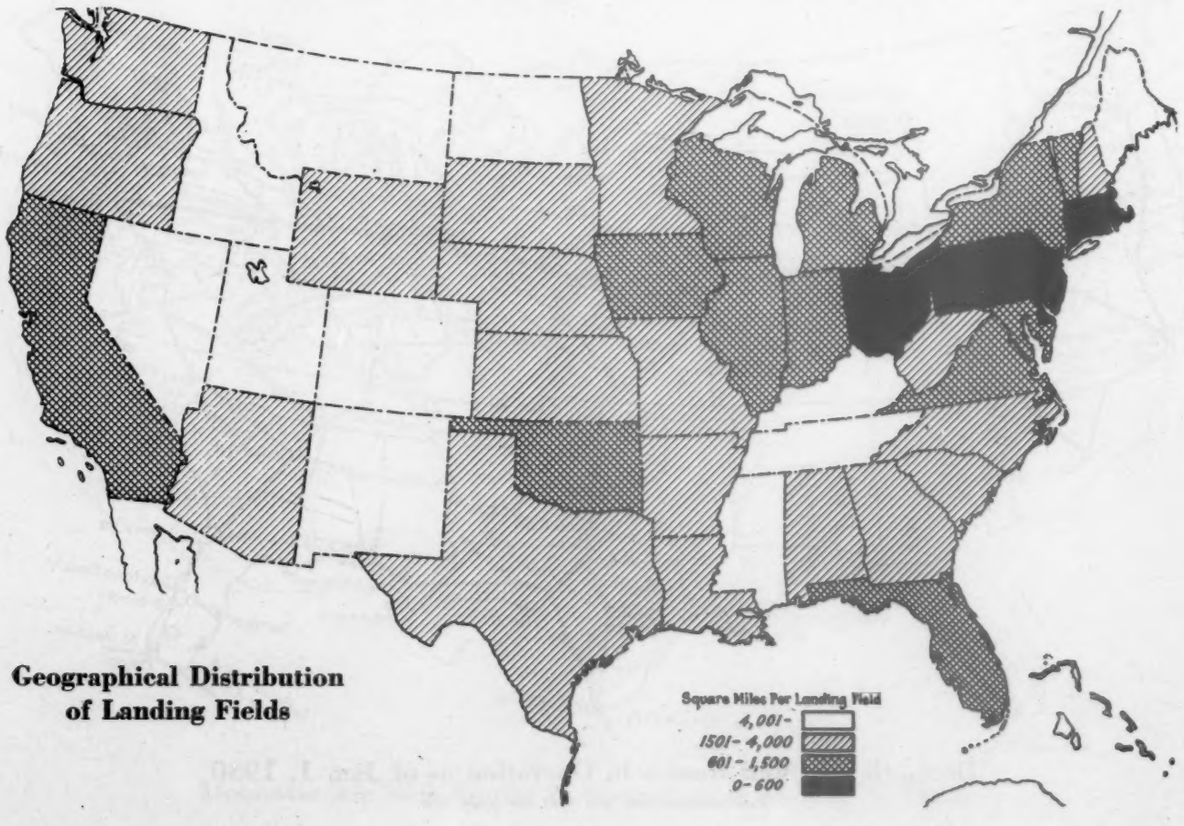
For explanation, see text on page 578

Airports AND *Schools*

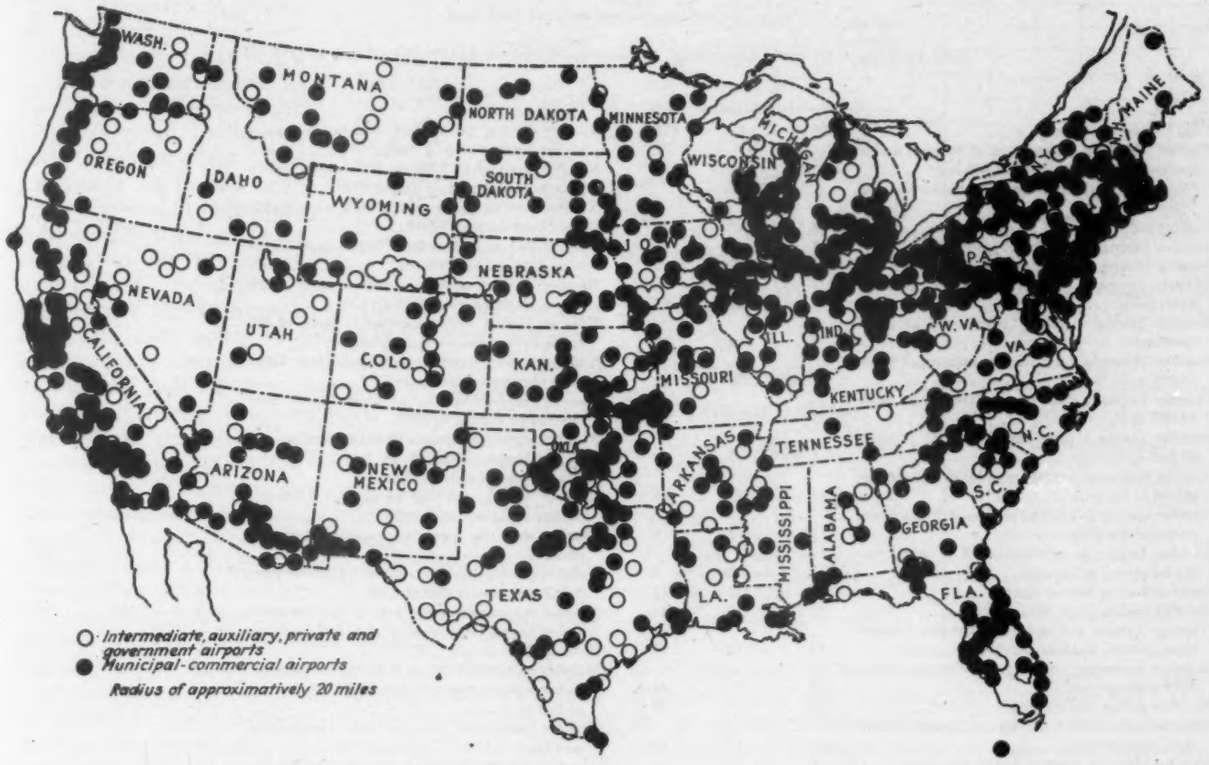
State	Municipal	Commercial	Intermediate	Auxiliary	Government	Total	Square Miles per Field	Number of Licensed and Identified Aircraft per Field
Alabama	3	4	5	2	..	14	3,710	2.21
Arizona	22	5	..	8	1	36	3,132	1.05
Arkansas	3	5	..	6	1	15	3,550	4.06
California	57	51	17	22	9	156	1,012	7.93
Colorado	10	5	6	3	1	25	4,160	2.96
Connecticut	4	2	1	4	..	11	455	11.18
Delaware	..	1	..	3	..	5*	246	6.60
District of Columbia	..	3	..	..	2	5	14	12.80
Florida	18	12	..	7	4	41	1,450	2.61
Georgia	11	2	5	1	2	21	2,810	3.23
Idaho	4	..	2	2	..	8	10,460	2.50
Illinois	8	35	13	7	3	66	858	11.05
Indiana	6	17	9	3	1	36	1,120	6.44
Iowa	11	14	16	2	1	44	1,275	3.57
Kansas	17	14	6	1	2	40	2,051	10.80
Kentucky	3	4	2	..	..	9	4,511	5.22
Louisiana	6	5	..	3	1	15	3,240	5.86
Maine	1	3	..	1	..	5	6,000	4.20
Maryland	1	4	..	6	4	15	663	6.19
Massachusetts	4	14	2	3	..	24*	3,450	9.88
Michigan	22	13	1	7	2	45	1,288	10.52
Minnesota	6	8	3	4	..	21	4,031	13.19
Mississippi	3	3	..	2	..	8	5,860	2.62
Missouri	9	7	4	2	..	22	3,152	23.73
Montana	9	5	8	..	..	22	6,665	3.04
Nebraska	6	8	13	3	1	31	2,497	7.29
Nevada	6	1	5	5	..	12	6,510	0.58
New Hampshire	5	..	..	1	..	6	1,557	2.83
New Jersey	4	15	2	5	4	30	274	9.10
New Mexico	13	2	1	8	1	25	4,880	0.80
New York	12	29	3	6	4	54	911	21.45
North Carolina	9	8	6	2	1	26	2,018	3.07
North Dakota	6	2	..	1	..	9	7,872	6.11
Ohio	15	29	20	8	4	76	539	7.52
Oklahoma	10	15	8	15	1	49	1,430	6.77
Oregon	12	3	3	6	..	24	4,025	4.52
Pennsylvania	13	38	21	12	2	86	524	3.88
Rhode Island	..	6	..	4	..	10	124	3.50
South Carolina	5	5	4	4	..	18	1,717	1.77
South Dakota	7	9	..	3	..	19	4,080	3.00
Tennessee	5	2	..	1	..	8	5,245	10.75
Texas	35	14	2	34	17	102	2,600	4.32
Utah	3	..	3	4	..	10	8,499	2.90
Vermont	3	2	..	4	..	9	1,062	1.55
Virginia	4	8	7	3	7	30*	1,420	2.13
Washington	11	9	..	7	3	40	2,304	5.22
West Virginia	3	2	..	3	..	8	306	3.62
Wisconsin	14	22	8	1	..	45	1,244	5.84
Wyoming	7	1	15	2	..	25	3,909	0.72
Total	446	466	221	241	79	1,456	.....	.....

*The total includes one private field which is not shown in breakdown by types.

Airports and Landing Fields (Nov. 15, 1929)



Geographical Distribution of Landing Fields



IN THE four and one-half months between June 30, for which date the table in the last statistical issue was compiled, and November 15, 79 new landing fields were added to the available list. In the next six weeks approximately 40 more were opened. The increase was well distributed over the country, the central states getting the largest share. Of the six states to show an improved rating on the distribution map at the top of the opposite page, four lie in the Mississippi valley.

There has been no addition to the list of states having at least one landing field for every six hundred square miles of area, and shown in solid black on the map. To insure safe and easy travel by air over the country, that is the most modest standard that ought to be considered, but only seven states have attained it, and all of them are in the northeastern region where the rugged topography makes artificially prepared landing fields especially important.

At the top of this page is shown the actual distribution of airports and auxiliary fields, each one being denoted by a circle of twenty-mile radius. While this permits of much overlapping and makes it impossible to pick out individual fields where they are crowded closely together, it shows airport conditions much better than the use of minute dots. It has often been taken as an ideal that a pilot should always, wherever he may be flying, have a prepared or marked landing field available within twenty miles, or if possible within ten, in case of emergency need for early descent. To have a landing field always within twenty miles would require, if they were uniformly spaced, approximately one for each two hundred square miles. The lower map on the opposite page, by the use of the twenty-mile radius, shows at once the areas within which flight can be practiced without ever getting more than twenty miles from an airport or a recognized auxiliary field. Thus it is possible to fly from Portsmouth, N. H., to Washington, or from New York to Des Moines, or from Boston to Rochester without more than minor deviations from the straight line and without ever being outside the twenty-mile radius from the nearest field. In the prairie states prepared fields are of relatively little importance. It is in the lower part of the Mississippi Valley and in the southeastern section of the United States, excepting Florida, that the largest gaps appear, without an assured supply of ideal natural landing places to take the place of the missing artificial ones.

Despite the shortage of airports in some areas, the table at the left reveals that airplanes are now spread out very thinly among the fields that already exist. In less than one-fifth of the states are there as many as ten planes per field on the average, and even if the auxiliary and intermediate fields be eliminated from consideration and only those designated as genuine airports be included in the count, there still are about a dozen states, both east and west, that show an average of less than four planes for each potential operating base.

The ratio between municipal and commercial fields varies widely among the various states. In the industrial centers, commercial airports predominate, outnumbering the municipal ones by more than two to one in New York, Illinois, Pennsylvania, and Massachusetts, and by almost exactly that ratio in Ohio. In the prairie states and in the Southwest, where governmental operation of public utilities is commoner than in the East, the ratios are reversed.

Airport Analysis

Based on questionnaires sent out to all listed ports.

Total investment reported: Commercial, $3,626,400; Municipal, $22,991,061; Total, $26,617,461

	Commercial	Municipal	Total
Total number reporting	50	81	131
Number reporting with an area of 80 acres and a longest runway of at least 2,000 feet*	31	58	89
*Note: All further analysis is based on this group only.			
Number reporting total investment	24	48	72
Number having an area of at least 300 acres	7	14	21
Number having an area of at least 600 acres	3	7	10
Number having a longest runway of at least 3,000 feet	19	36	55
Number having a longest runway of at least 5,000 feet	2	10	12
Number having a total hangar area of at least 10,000 sq.ft.	12	30	42
Number having a total hangar area of at least 30,000 sq.ft.	3	17	20
Number having a total hangar area of at least 80,000 sq.ft.	1	5	6
Number having an average of at least 10 machines stored in hangars	12	23	35
Number having an average of at least 20 machines stored in hangars	2	17	19
Number having an average of 50 or more machines stored in hangars	1	8	9
Number having beacon lights	13	29	42
Number having flood lights	13	28	41
Number owning and operating hangars (others lease ground, hangars privately operated)	25	32	57
Number operating repair shop directly under field management	22	22	44
Number selling fuel directly	22	27	49
Number operating "hop" service directly under field management	21	21	42
Number charging landing fees to transients	0	1	1
Number used as a stop by at least one transport company	8	27	35
Number used as a stop by 3 or more transport companies	4	8	12
Number with at least one school operating from field	19	39	58
Number with 3 or more schools operating from field	2	18	10
Number with at least one aerial service operating from field	25	46	71
Number with 3 or more aerial services operating from field	4	18	22

	Commercial	Municipal	Total
Number having had at least 500 cross-country planes landing at field during 1929	7	15	22
Number having had 5,000 or more cross-country planes landing at field during 1929	0	5	5
Number having had at least 1,000 local flights from field during 1929**	9	19	28
Number having had at least 10,000 local flights from field during 1929**	0	4	4
Number having accommodated at least 1,000 transport passengers during 1929	2	8	10
Number having accommodated at least 10,000 transport passengers during 1929	1	5	6
Number having accommodated at least 1,000 local passengers during 1929**	10	16	26
Number accommodating at least 10,000 local passengers during 1929**	0	5	5
Number reporting receipts from hangar rentals	14	26	40
Number having received at least $5,000 for hangar rentals during 1929	1	5	6
Number having received at least $20,000 for hangar rentals during 1929	0	2	2
Number reporting receipts from non-flying concessions	10	10	20
Number having received at least $3,000 for non-flying concessions during 1929	3	2	5
Number reporting receipts from flying concessions	10	12	22
Number having received at least $3,000 for flying concessions during 1929	6	5	11
Number reporting receipts from the sale of fuel	13	16	28
Number having received at least $3,000 for sale of fuel	1	4	5
Number reporting receipts from mechanical services	10	11	21
Number having received at least $1,000 for mechanical services	3	2	5
Number reporting receipts from transport companies	1	2	3
Number having received at least $3,000 from transport companies	0	0	0
Number reporting total receipts	18	32	50
Number reporting total expenses	13	21	34
Number of the above showing an operating profit (not including such items as depreciation)	7	4	11

**Returns on these points are very incomplete, many airports keeping no records.

EXCEPTIONALLY satisfactory returns from the airport questionnaire were received from the municipal airports. Among those reporting were Oakland, Chicago, Cleveland, Buffalo, Detroit, Boston, and a number of others of special importance. Returns on commercial fields were less complete. The figures would therefore naturally show a slight bias towards the municipal side.

Making all allowance for that, however, the apparent discrepancy between the two groups remains surprising. For the commercial fields reporting the total investment on development, the average outlay was only $151,000. For the municipal fields it reached $479,000. Of the nine fields used regularly as a base of operation for fifty or more airplanes, eight were municipally operated.

The most interesting features of the returns on the questionnaires were the reports on operating policies and nature of operation. It appears that of the 89 fields large enough to be reckoned as genuine airports and used in a calculation of general tendencies, 80 per cent of the commercial operators and 55 per cent of the municipalities have constructed hangars and operate them directly under field management. Seventy per cent of the commercial fields and 38 per cent of the municipal group operate their own repair shops, while the corresponding percentages for the direct sale of fuel by the field management are 70 and 46. About 40 per cent of the municipalities appear to make it a policy to keep clear of all direct operation of utilities, contenting themselves with providing the landing area. It is a little surprising to find almost 40 per cent of the municipal fields listed as operating a "hop" service directly, but it is presumed that in most cases that is a semi-private venture of the airport manager's rather than one for which the municipality itself takes the responsibility.

The charging of landing fees on all planes as a source of revenue, a comparatively popular income-producing device in Europe, has taken no hold in the United States. Only one of the 89 airports makes any such charge.

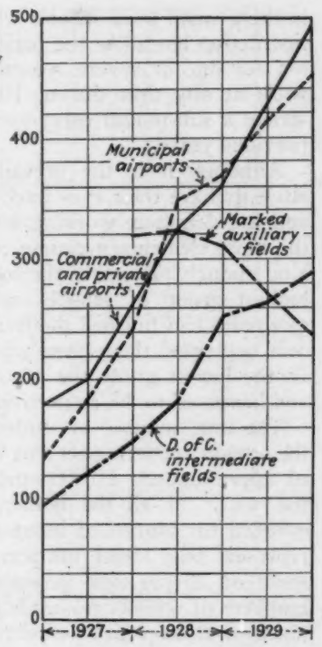
The records of magnitude of operation speak for themselves. The financial returns were naturally very incomplete. Of the 50 fields that did report on revenue, 40 received at least a part of it from hangar rentals. Only six took in as much as $5,000 from that source. The next most popular item was the sale of fuel, which contributed in 28 cases, but only five ran to $3,000 or more. Receipts for mechanical services were even slenderer. Out of a total of 13 commercial and 21 municipal fields giving enough financial data to make a determination possible, seven and four, or 54 per cent and 19 per cent, respectively, showed an operating profit.

THE PROGRESS of airport construction has been very unsteady. Municipal airport construction had its first boom in 1924 and 1925, followed by a temporary slowing down. The Lindbergh flight, and especially Colonel Lindbergh's subsequent tour of the country in the interest of airport development, touched off the enthusiasm of public authorities once more, and construction proceeded at a steadily accelerating rate up to the middle of 1928, the record being made in the first half of that year with the opening of an average of nearly five new ports every week for six months. At that point there came an abrupt check, and municipal construction has since proceeded at a more sober rate. The municipal governments of moderate "sales resistance" were reached during the period immediately following Colonel Lindbergh's trip, the other demonstrations promoted by the Guggenheim Fund, and the early campaigns by the Department of Commerce. City councils that survived 1927 without appropriating for aeronautical facilities have been hard to persuade.

Dates	Municipal Airports	Commercial and Private Airports	Department of Commerce Intermediate Fields	Marked Auxiliary Fields
July 1, 1926.....	120*	155*	...	...
Jan. 1, 1927.....	140*	180*	...	...
July 1, 1927.....	180*	200*	...	...
Jan. 1, 1928.....	240	263	154	320
July 1, 1928.....	352	325	183	326
Jan. 1, 1929.....	368	365	256	312
July 1, 1929.....	414	420	263	274
Jan. 1, 1930.....	453	495	285	235

*Approximate.

Airport Construction Data



Three years of airport construction progress in the United States

Commercial construction shows a different trend. That, too, after a period in the doldrums was set briskly in motion by the Lindbergh excitement of 1927. The increase in the number of commercial fields was less rapid than that in municipal airports, and the governmental fields outnumbered the private ones for the first time in the spring of 1928.

Nineteen twenty-nine showed a reversal. The public rush into the stock market in pursuit of aeronautical securities made the financing of new airports comparatively easy. While municipal construction was still going slowly, additions to the number of commercial fields were being made at about three per week, and they again took the lead in number just a year after they had lost it. At the present time the commercial fields outnumber the municipal ones by approximately ten per cent, after having been eight per cent behind eighteen months ago.

The Department of Commerce auxiliary fields have increased in number at a somewhat variable rate. The most rapid progress was made in the latter part of 1928, corresponding to the completion of preparations for night flying on the western part of the transcontinental route. In the meantime, marked auxiliary fields have been steadily decreasing in number.

FLYING SCHOOLS

AS THERE IS no official publication of data on flying schools other than a rough annual estimate of their total number, information upon their operations was sought directly by the circulation of a questionnaire to all schools to which the addresses could be secured. Reasonably full replies were received from schools representing approximately 25 per cent of the present teaching activity of the United States. While that return is by no means a satisfactory basis for estimates of total activity, it does serve to indicate certain trends in school operation.

As a basis for a statistical presentation the schools replying, sixty in number, were divided into three groups designated *A*, *B*, and *C*. Schools in group *A* are those which have been approved by the Department of Commerce or, in two or three cases, have not yet been approved but deserve the highest rating by virtue of their long and successful record and generally good reputation. Group *B* is made up of schools that are operating on a reasonably large scale and that are favorably known in the aeronautical world, while group *C* includes those of very brief experience, of small and purely local activity, or with a record characterized by great irregularity of operation.

Certain of the results for the three groups are tabulated on the next page.

The figures given speak for themselves. It is apparent that a very large proportion of the so-called flying schools of the United States are actually confining themselves to giving small amounts of instruction in connection with the merchandizing of airplanes or with aerial service activities, and that in the nature of things many of them cannot maintain any proper equipment for advanced training. Thus, out of the twenty schools listed in group *C*, only eleven are even attempting to give a transport course. With an average of sixteen students enrolled during the year and only eight graduated, and with 80 per cent of the total enrollment in the private flying course, they obviously cannot maintain themselves upon the receipts of flying instruction alone. The rather bizarre relationship between the number of students enrolled during 1929 and the number under instruction at any one time in group *C* can only be accounted for by the existence of a large class of students

in these small local schools who remain nominally under instruction but allow the period of their tuition to string out for one or several years. The nominal number at work at any time during 1929 would, therefore, have shown a substantial carry-over from the enrollments of previous years.

Although it is the prevailing impression that most students have their eyes fixed upon the transport license and are definitely working towards it, it is evident that the most elementary course remained dominant at least long enough to control the total for 1929. Even in the highest group of schools, only seven per cent of the graduates had finished the transport course, while 60 per cent contented themselves with the private qualification. In the lowest grade the percentages had fallen to four and increased to 80, respectively.

The total number of students enrolling in 1929 in all the schools rendering returns was 2,838, as against a total of approximately 20,000 student permits issued during the year. If all the holders of permits had actually enrolled for courses of instruction, our tabulations would represent only about fourteen per cent of the total, instead of 25 per cent as estimated on the basis of the numbers of schools responding and the estimated importance of those which failed to reply. The indication is strong that a very large number of student permit holders never even reached the point of formal enrollment in a school.

In the Class *A* schools each flying instructor was able to take care of approximately fifteen students on the average at the time of greatest activity. For individual schools reporting, the ratio ranged from five to 42 students per instructor. The lower classifications of schools actually had fewer students per instructor than those in group *A*, but that is probably due to the fact that most of the instructors in the approved schools are employed primarily, if not solely, in that rôle, while in the small local schools they are likely also to be doing taxi work or demonstrating airplanes to prospective customers.

PARTICULARLY interesting are the figures pertaining to tuition charges. It is noticeable that the schools of longest experience and the best reputations, as a whole and of course with many individual exceptions, are prone to charge the highest rates, and also that they come nearest to standardization on fixed figures. Sixty per cent of the tuition charges quoted by the group *A* schools lay within ten year cent of the mean charge for the type of course under consideration, while for the Class *C* schools that had dropped to less than thirty per cent lying within that narrow price range. Of course geographical factors entered to some extent, tuition charges usually being highest for schools located at expensive resorts and for those which specialized on training for private owners. The actual range of prices among the group *A* and group *B* schools, ignoring group *C*, was from $2,285 to $5,250 for a transport course, from $750 to $1,650 for a limited commercial, and from $330 to $750 for a private.

Furthermore, there was no general agreement about the relative amount of work involved in giving the several courses. The ratio of transport to private tuition ranges for the various schools replying ranged (in groups *A* and *B* only) from 5.1 to 10, although a majority of the well-established schools group very closely around eight for this ratio. The corresponding figures for the ratio between limited commercial and private ranged from 1.8 to 3.0, with 2.4 as the median.

Of particular interest were the replies returned by the school operators to the question relative to the distribution of their students' interest in aviation. While there was a wide range in the figures given, the differences usually had a rational explanation. Schools which specialize in transport courses and in offering easy time payments find that almost all of their students (95 per cent in one leading school and 90 in two or three others) plan to become transport pilots, while the proportion aspiring to buy their own planes may be as low as one or two per cent. In schools run at an airport with a country club aspect or at a popular winter or summer resort, on the other hand, the proportion of would-be transport flyers may fall as low as 20 per cent and that of prospective private owners run as high as 40. In only three cases was it believed that more than 40 per cent of the students would be in the market for planes of their own.

There will be noted the slight tendency to increase of private ownership in progressing from the highest to the lowest group of schools. While that may be partly due to private owners preferring to take instruction from a small school in their neighborhood where it will imply a minimum of interference with their business, it seems more likely that most of the difference is due to over-optimism on the part of some of the small and comparatively inexperienced school operators. Study of the individual figures suggests that somewhere around twelve to fifteen per cent would be the fairest all-inclusive estimate of those who plan private purchases.

Tabulation

	A	*B*	*C*
Total number of schools reporting	13	28	20
Number of schools having operated at least since 1925	6	6	2
Average number of flying instructors per school	3.5	2.0	1.4
Average number of ground instructors per school	4.6	2.5	1.8
Average number of graduates per school since starting operations	225	70	11
Average number of graduates from transport course during 1929	2.5	1.3	0.4
Average number of graduates from limited commercial course during 1929	13.0	8.4	1.5
Average number of graduates from private course during 1929	23.0	23.0	6.8
Total number of students enrolled in 1929	1,130	1,462	286
Average number enrolled per school	87	54	16
Average maximum number of students under instruction at any one time in 1929	55	31	16
Median charge for transport course*	$4,100.00	$3,400.00	$3,500.00
Median charge for limited commercial course*	$1,300.00	$1,090.00	$1,125.00
Median charge for private course*	$550.00	$490.00	$480.00
Median estimate of school operators of percentage of students planning to secure employment as transport pilots	55	50	50
Median estimate of percentage looking forward to employment in the aircraft industry, but with only incidental piloting	20	20	20
Median estimate of percentage planning to purchase private airplanes	10	20	25
Percentage of schools offering a time payment plan. (Not including schools selling flying instruction by the hour and permitting payment as taken)	93	70	60
Average proportion of students availing themselves of time payment plan where one is available	90	90	.....

*The median is slightly superior to the ordinary arithmetical average as a means of showing the trend in such a figure as this. Those of our readers who are not familiar with the term and its use can consider it as being the average charge, from which it would differ only slightly.

N.A.C.A., N.A.A.

AND

Weather Bureau

THE STATISTICAL RECORD of the activities of the National Advisory Committee for Aeronautics puts in evidence the growing dependence of the aircraft industry upon its work and the appreciation of its importance in Congress, as proved by steadily increasing appropriations. The scale of the work at Langley Field and the amount of money made available for the salary lists and for general maintenance there and in Washington, as well as at the Committee's Paris office, has more than doubled in the last six years. In the same length of time the demands for the published information prepared by the Committee have practically tripled in number. During the past year the total number of the Committee's separate publications and also the number originating in the research of its own staff have been appreciably increased over any previous year.

Appropriations and Personnel of National Advisory Committee for Aeronautics

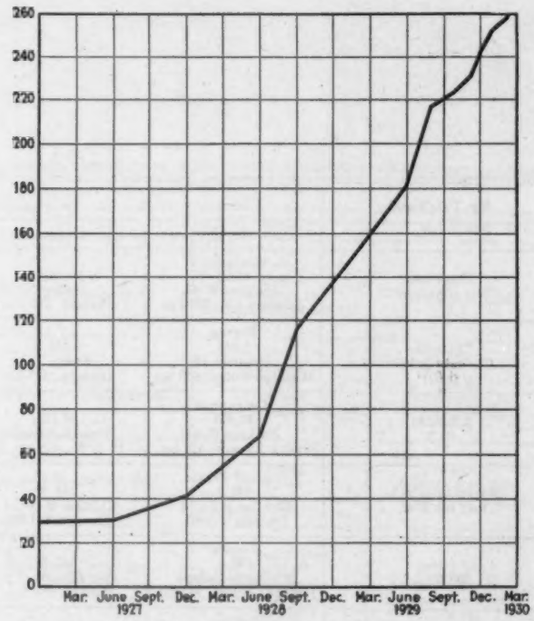
Fiscal Year	Total Appropriations	Employees at Langley Field Laboratories
1923	225,600	53
1924	307,000	77
1925	470,000	107
1926	534,000	121
1927	513,000	141
1928	550,000	156
1929	628,770	177
1930	*1,508,000	197
1931	*1,321,000[1]	225[2]

*Material increase includes $763,000 in 1930 and $435,000 in 1931 for construction of full scale wind tunnel, seaplane channel, and heating plant. Amounts available for general purposes, $745,000 for 1930 and $886,000 for 1931.
[1]Tentative only. Bill now before Congress. [2]Budget estimate.

Publications of National Advisory Committee for Aeronautics

	Technical Reports	Technical Notes	Technical Memorandums	Aircraft Circulars	Total Copies Distributed
1923	21	51	67	..	36,870
1924	23	37	52	..	37,209
1925	22	19	49	..	35,884
1926	27	24	47	26	39,207
1927	28	17	52	38	55,636
1928	20	30	50	23	70,663
1929	35	28	52	19	104,076

	Technical Reports		Technical Notes	
	Originating With N.A.C.A.	All Other Sources	Originating With N.A.C.A.	All Other Sources
1923	8	13	11	40
1924	10	13	15	22
1925	8	14	12	7
1926	14	13	19	5
1927	17	11	10	7
1928	15	5	20	10
1929	20	15	19	9



Number of special meteorological stations along airways

Specific Appropriations for Weather Service on Civil Airways

Fiscal Year Ending June 30		Fiscal Year Ending June 30	
1927	$75,000	1929	243,500
1928	120,000	1930	710,000
		1931	1,310,000

FOR ABOUT eighteen months now the Weather Bureau has been extending its surveillance of civil airways by establishing new observing stations at the almost constant rate of two per week. The appropriation for airways work for the coming fiscal year is more than ten times as large as that of two years ago, and the number of observing stations now operating has been multiplied by six since the beginning of 1928.

N.A.A. Activities to September 1, 1929

	1925	1926	1927	1928	1929
Membership at end of year	5,100	4,800	5,660	7,200	7,632
Chapters formed up to end of year	....	71	98	158	194
Number of F.A.I. certificates issued during year	175	209	200	242	400
Number of N.A.A. sporting licenses issued	427	539	394	559	685
Number of race meets sanctioned	....	10	11	16	35
Number of air tours sanctioned	....	1	1	1	6

THE MEMBERSHIP of the National Aeronautic Association and the number of chapters active continue a steady though gradual increase. The control of aeronautical contests is among the Association's most important activities, and the number of events sanctioned and of pilots' certificates issued furnish a good record of the total of aeronautical sporting activity. It will be recalled, of course, that the F.A.I., certificate is issued once and for all, and it is a prerequisite to any competitive flying, while the sporting license, also required for entry in a sanctioned contest, must be renewed each year. The number of sporting licenses for 1929 ran more than 20 per cent beyond any previous year, while the total number of contests sanctioned was well over double the best previous figure.

American AND

Table 1: Class C Airplanes Returning to

Kg. Pay Load	0		500		1000	
	World	American	World	American	World	American
Duration (hr., min., sec.)	Germany 65:25 Junkers W-33 Junkers LV, 280 hp.	59:19:15 Bellanca Wright, 220 hp.	France 23:22:49 Breguet 19 Hispano Suiza, 600 hp.	09:11:53.4 Douglas DT-2 Liberty, 400 hp.	France 18:01 Breguet Hispano-Suiza, 600 hp.	02:13:49 Martin Bomber 2 Liberty, 400 hp. ea.
Distance Closed Circuit (mi.)	France 5,015 Breguet 19 Hispano-Suiza, 600 hp.	2,516 6 Army T-2 Liberty, 375 hp.	France 2,639 Breguet 19 Hispano-Suiza, 600 hp.	590.3 Douglas DT-2 Liberty, 400 hp.	France 2,060 Breguet Hispano-Suiza, 600 hp.	.....
Altitude (ft.)	Germany 41,794 Junkers W-34 Bristol Jupiter, 425 hp.	39,140 Wright-Apache P. & W., 425 hp. S.	France 30,654 Breguet 19 Farman, 500 hp.	28,143 TP-1 Liberty, 400 hp.	France 26,538 Breguet 19 Farman, 600 hp.	16,732 TP-1 Liberty, 400 hp.
Speed in m.p.h. for: 100 Km.	United States 249.3 Curtiss R-3-C-I Curtiss V-1400	249.3 Curtiss R-3-C-I Curtiss V-1400	United States 185.4 Lockheed Vega P. & W., 425 hp.	185.4 Lockheed Vega P. & W., 425 hp.	United States 176 Lockheed Vega P. & W., 425 hp.	176 Lockheed Vega P. & W., 425 hp.
500 Km.	France 190.6 Nieuport-Delage Hispano-Suiza, 500 hp.	167.8 Verville-Sperry Wright, 350 hp.	United States 171.2 Lockheed Vega P. & W., 425 hp.	171.2 Lockheed Vega P. & W., 425 hp.	United States 168.1 Lockheed Vega P. & W., 425 hp.	168.1 Lockheed Vega P. & W., 425 hp.
1,000 Km.	France 154.3 Nieuport-Delage Hispano-Suiza, 500 hp.	127.4 DH-4L Liberty, 400 hp.	United States 152.7 Lockheed Vega P. & W., 425 hp.	152.7 Lockheed Vega P. & W., 425 hp.	United States 152.7 Lockheed Vega P. & W., 425 hp.	152.7 Lockheed Vega P. & W., 425 hp.
2,000 Km.	France 135.9 Nieuport-Delage Hispano-Suiza, 500 hp.	114.2 DH-4L Liberty, 375 hp.	France 130 Breguet 19 Hispano-Suiza, 600 hp.	.....	Germany 127.6 Rohrbach-Roland 3 B. M. W., 230 hp. ea.	.....
5,000 Km.	France 116.8 Breguet Bidor Hispano-Suiza, 600 hp	.....	.....	.....	.....	.....

S = Supercharged.

Table 2: Class

Kg. Pay Load	0		500		1000	
	World	American	World	American	World	American
Duration (hr., min., sec.)	United States 36:01 PN-12 2 Wright, 525 hp. ea.	36:01 PN-12 2 Wright, 525 hp. ea.	United States 20:45:40 PN-10 2 Packard, 600 hp. ea.	United States 20:45:40 PN-10 2 Packard, 600 hp. ea.	United States 17:55:14 PN-12 2 Wright, 525 hp. ea.	17:55:14 PN-12 2 Wright, 525 hp. ea.
Distance Closed Circuit (mi.)	United States 1,569 PN-10 2 Packard, 600 hp. ea.	1,569 PN-10 2 Packard, 600 hp. ea.	United States 1,569 PN-10 2 Packard, 600 hp.	United States 1,569 PN-10 2 Packard, 600 hp.	United States 1,336 PN-12 2 P. & W., 525 hp. ea.	1,336 PN-12 2 P. & W., 525 hp. ea.
Altitude (ft.)	United States 38,560 Wright Apache P. & W. 425 hp. S.	38,560 Wright Apache P. & W. 425 hp. S.	Germany 27,750 Junkers W-34 Bristol Jupiter, 420 hp.	22,178 Vought Corsair P. & W., 425 hp.	Germany 20,960 Junkers W-34 Bristol Jupiter, 420 hp.	19,593 PN-12 2 P. & W., 525 ea.
Speed in m.p.h. for: 100 Km.	Great Britain 330.1 Supermarine S-6 Rolls Royce-R	241.7 Curtiss R-3-C-2 Curtiss V-1550	Germany 161.5 Heinkel HD 38 B.M.W., 600 hp.	147.2 Vought Corsair P. & W., 425 hp.	Germany 146.2 Heinkel B. M. W., 600 hp.	92.53 PN-10 2 Packard, 600 hp. ea.
500 Km.	United States 161.14 Curtiss Navy C-3 Curtiss D-12, 450 hp.	161.14 Curtiss Navy C-3 Curtiss D-12, 450 hp.	Germany 146 6 Heinkel HE 9a B.M.W., 600 hp.	136 02 Vought Corsair P. & W., 425 hp.	Germany 146.6 Heinkel HE-9a B. M. W., 600	90.52 PN-10 2 Packard, 600 hp. ea.
1,000 Km.	Germany 138.1 Heinkel HE9 B.M.W. VI, 600 hp.	130.9 Vought Corsair P. & W., 425 hp.	Germany 138.1 Heinkel HE9 B.M.W.-6, 600 hp.	88.69 PN-10 2 Packard, 600 hp. ea.	Germany 110.2 Dornier Superwal 4 Gnome-Rhone-Jupiter	88.69 PN-10 2 Packard, 600 hp. ea.
2,000 Km.	Switzerland 106.9 Dornier Merkur B.M.W., 600 hp.	78.64 Navy PN-10 2 Packard, 600 hp. ea.	Switzerland 106.9 Dornier Merkur B.M.W., 600 hp.	78.7 PN-10 2 Packard, 600 hp. ea.	United States 81.04 PN-12 P. & W., 525 hp.	United States 81.04 PN-12 P. & W., 525 hp.

Table 3: Light Plane Records

	First Category— Two Seaters Weight Empty Less than 400 Kg. (881 lb.)		Second Category— Single Seaters Weight Empty Less than 200 Kg. (440 lb.)		Third Category— Single Seaters Weight Empty 200—350 Kg. (440—771 lb.)	
	World	American	World	American	World	American
Distance Closed Circuit (mi.)	Italy 1,701 Fiat A.S. 1 Fiat A-50, 85 h..	.....	Hungary 403.9 Lampich Thorutskai, 18 hp.	.....	Czechoslovakia 1,553 Avia BH-11-B Walter, 60 hp.	.....
Distance Airline (mi.)	Switzerland 811.1 Klemm Daimler Mercedes-Daimler 20 hp.	.....	Hungary 321.3 Lampich H-MAFD Thorutskai, 18 hp.	.....	United States 1,650 Barling NB3 Genet 80 hp.	1,650 Barling NB3 Genet 80 hp.
Duration	Italy 29:04 Fiat A.S. 1 Fiat A-50, 85 hp.	.....	.....	.....	.....	.....

World Records

point of departure without refueling

2000		5000	
World	American	World	American
Germany 13:01:12 Junkers G-24 Junkers, 280 hp.	1:47:10.5 Barling Bomber 6 Liberty, 400 hp. ea.	France 1:12:21 Super Farman Goliath 4 Farman, 500 hp. ea.	.....
Germany 1,088 Rohrbach-Roland 3 B. M. W., 230 hp. ea.	.....	.....	.....
Italy 20,544 Caproni CA-73 2 Isotta Fraschini, 500 hp.	6,722 Barling Bomber 6 Liberty, 400 hp. ea.	France 11,765 Super Farman Goliath 4 Farman, 500 hp. ea.	.....
France 138.9 Bernard Hispano-Suiza, 600 hp.			
Germany 133.8 Rohrbach-Roland 3 B. M. W., 230 hp. ea.			
Germany 133.5 Rohrbach-Roland 3 B. M. W., 230 hp. ea.			
.....			
.....			

NOTE:

In these tables, records for duration, distance, and speed have been credited as made without waiting for homologation by the F. A. I. Altitude records, which are often changed by calibration, are not so included.

	World	American
Airline Distance (mi.)	France 4,948.6 Breguet 19 Hispano-Suiza, 600 hp.	3,911 Bellanca-Wright J-5
Straightaway Speed (m.p.h.)	France 278.48 Ferbois Hispano-Suiza, 550 hp.	266.6 Curtiss R-2-C-1 Curtiss D-12a
Payload to 2,000m. (lb.)	France 13,228 Super Farman Goliath 4 Farman, 500 hp. ea.	4,409 Barling Bomber 6 Liberty, 400 hp. ea.
Refueling Duration (hr., min., sec.)	United States 420:21:30 Curtiss Robin Curtiss Challenger, 170 hp.	420:21:30 Curtiss Robin Curtiss Challenger, 170 hp.
Refueling Distance (mi.)	United States 7,200 Buhl Air Sedan Wright J-6	7,200 Buhl Air Sedan Wright J-6
.....	Airplane United States .. 9 France .. 16 Germany .. 9 Italy .. 1 Great Britain .. 0	

C2 Seaplanes

2000		4000	
World	American	World	American
United States 16-39-00 PN-12 2 P. & W., 525 hp. ea.	16-39-00 PN-12 2 P. & W., 525 hp. ea.	Germany 6:01:56 Dornier Superwal 4 Gnome-Rhone-Jupiter	.....
United States 1,336 PN-12 2 P. & W., 525 hp. ea.	1,336 PN-12 2 P. & W., 525 hp. ea.	Germany 621.4 Dornier Superwal 4 Gnome-Rhone-Jupiter	.....
France 15,837 C. A. M. S. 2 Hispano-Suiza, 600 hp.	15,426 PN-12 2 P. & W., 525 hp. ea.	Germany 9,334 Dornier Superwal 4 Gnome-Rhone-Jupiter	.....
United States 132.5 Sikorsky S-38 2 P & W., 575 hp. ea.	132.5 Sikorsky S-38 2 P. & W., 575 hp. ea.	Germany 130.1 Dornier Superwal 4 Gnome-Rhone-Jupiter	.....
Germany 111.48 Dornier Superwal 4 Gnome-Rhone-Jupiter	90.52 PN-10 2 Packard, 600 hp. ea.	Germany 111.4 Dornier Superwal 4 Gnome-Rhone-Jupiter	.....
Germany 110.2 Dornier Superwal 4 Gnome-Rhone-Jupiter	88.7 PN-10 2 Packard, 600 hp. ea.	Germany 110.2 Dornier Superwal 4 Gnome-Rhone-Jupiter	.....
United States 81.04 PN-12 2 P. & W., 525 hp. ea.	81.04 PN-12 4 P. & W., 525 hp. ea.	.....	.....

	World	American
Airline Distance (mi.)	United States 1,841 PN-9 2 Packard, 500 hp. ea.	4,409 Barling Bomber 6 Liberty, 400 hp. ea.
Straightaway Speed (m.p.h.)	Great Britain 357.7 Supermarine S-6 Rolls Royce R	245.7 Curtiss R-3-C-2 Curtiss V-1400
Payload to 2,000 m. (lb.)	Germany 14,220 Rohrbach Romar 3 B. M. W., 500 hp. ea.	7,726 PN-10 2 Packard, 600 hp. ea.
.....	Seaplane Switzerland .. 2 United States .. 13 France .. 1 Germany .. 19 Italy .. 0 Great Britain .. 2	Total 2 22 17 28 1 2

Table 3: Light Plane Records

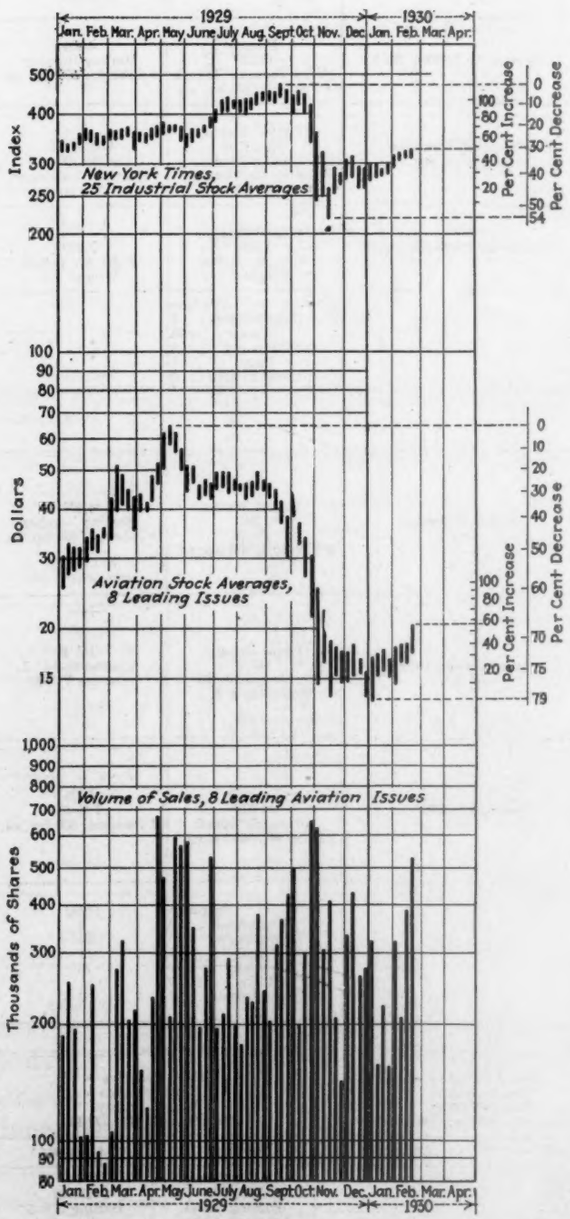
(Continued)

	First Category— Two Seaters Weight Empty Less than 400 Kg. (881 lb.)		Second Category— Single Seaters Weight Empty Less than 200 Kg. (440 lb.)		Third Category— Single Seaters Weight Empty 200—350 Kg. (440—771 lb.)	
	World	American	World	American	World	American
Altitude (ft.)	Great Britain 19,862 DH Moth 60 G Gipsy 85 hp.	.....	Poland 13,254 R.W.D.-2 Salmson, 40 hp.	.....	United States 27,500 Barling NB-3 Lambert, 90 hp.	27,500 Barling NB-3 Lambert, 90 hp.
Speed for 100 Km. (m. p. h.)	United States 127.0 Inland Sport Warner 110 hp.	127.0 Inland Sport Warner, 110 hp.	.....	.....	Great Britain 186.47 DH Tiger Moth DH 32, 130 hp.	.....
.....	.....	.....	.....	.....	.....	.....

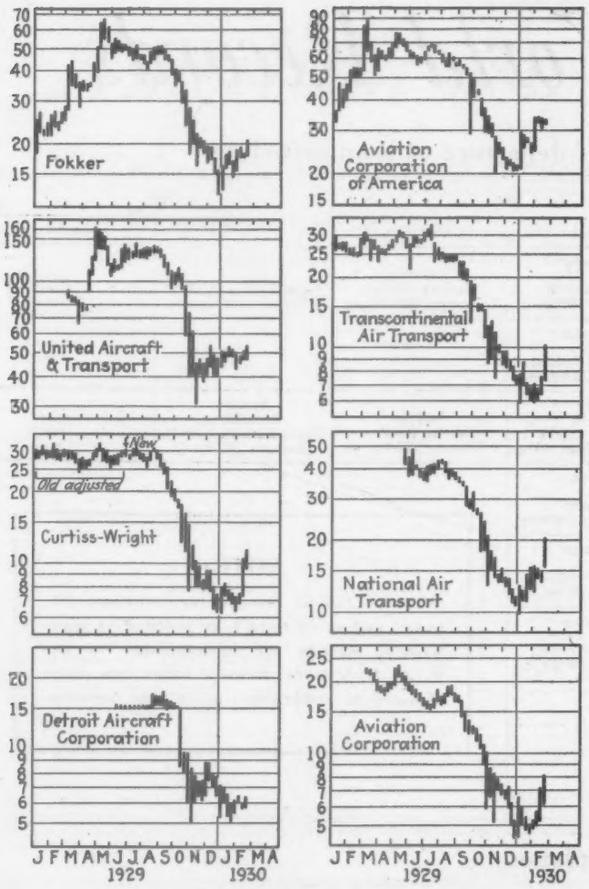
AERONAUTICAL

Finance

(All data compiled, and text prepared, by R. H. Doan)


1929
1930
Jan. Feb. Mar. Apr. May June July Aug. Sept Oct. Nov. Dec. Jan. Feb. Mar. Apr.
Index
New York Times, 25 Industrial Stock Averages
Per Cent Increase
Per Cent Decrease
Dollars
Aviation Stock Averages, 8 Leading Issues
Volume of Sales, 8 Leading Aviation Issues
Thousands of Shares

Average prices on aviation securities and on miscellaneous industrial stocks and volume of trading.



Aviation security price ranges.

AMONG the thirty odd aviation stocks actively traded in day by day through the organized exchanges, there is a small group of issues whose movements may be considered as supplying the key to the aviation security market. These stocks represent not only a complete cross-section of the industry, but fifty per cent or more of its entire capital investment. As these few dominant issues go, so goes the industry.

With the increase in the volume of trading in aviation shares, as well as the number of stocks outstanding, it has become essential for the investor as well as the professional trader to center attention on the few leading isues and to disregard movements in the larger number of unimportant stocks which make up the bulk of daily trading in air stocks. Newspaper market pages now print each day quotations on some forty or more different issues, together with a quantity of uncorrelated factual data. So far as the trend of events in aviation is concerned the greater part of this material is meaningless. The great proportion of the trading in air stocks that really matters is concentrated in less than a dozen issues, and of these some half dozen or so are by far the most important.

Quite obviously an index of the movements of these leaders should prove a valuable measure as it would contain the essence of this market undistorted by irregular fluctuations in the minor issues. Such an index, covering weekly price changes and volume of sales, has been constructed and is presented here.

The idea of a group of stocks which may serve as an adequate measure of the rest of the market is not a new one. We are all familiar with the phrase "pivotal stocks," and frequently some small number of issues achieve the distinction of a nickname. Suffice it to say that we are not trying to name any would-be leaders in this sense. Neither does their selection for this index mean that we consider them the only aviation issues of real value. There are unquestionably many more. But, from the standpoint of past market behavior, the diversified and representative nature of the issues, the banking sponsorship and wide distribution of the shares, it has been considered that this selection will, at the present time, present a fairly true picture of the basic trend in the aviation investment market as a whole.

OBVIOUSLY as the necessity for some accurate measure of the major course of aviation security prices may be, however, up to the present no index of the leading issues has been available. The problem of constructing such an index necessitates: first, the selection of the stocks to be included; second, the method of combining these stocks into the index.

The first part of the problem is evidently the more difficult, as it involves the classification of the stocks into those which are and those which are not the market leaders. Such a definite decision necessarily involves many elements not readily lending themselves to precise measurement. However, the outstanding characteristics of such representative stocks are chiefly: (1) a large normal volume of trading; (2) consistent movement with the market; (3) the size and importance of the company, and (4) that the shares be listed on an organized exchange where daily quotations and sales volume may be obtained.

Because of the above named qualities, their normal volume of trading, the general regularity of their price fluctuations, the approximate similarity in the spread, and their representative nature, the following eight stocks have been selected for inclusion in this index:

Primarily Manufacturing

Curtiss-Wright
United Aircraft & Transport
Detroit Aircraft Corporation
Fokker Aircraft Corporation

Primarily Transport

Aviation Corporation
Transcontinental Air Transport
National Air Transport
Aviation Corporation of the Americas

Throughout the period here reviewed the transactions in these stocks easily furnished more than two-thirds of the total transactions in all aviation issues. The average daily activity has been in excess of fifty thousand shares while the weekly volume has averaged over the past forty weeks, better than three hundred thousand shares weekly.

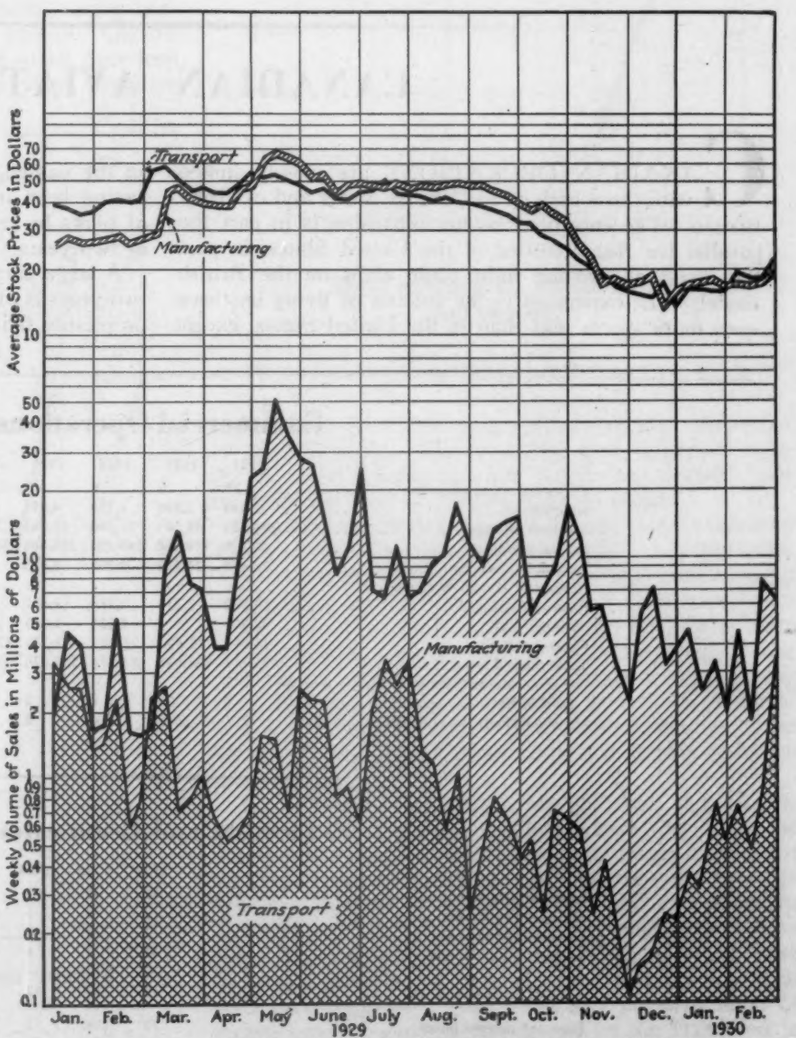
The following table gives the average degree of variance as to trading activity together with the relative number of shares outstanding:

	Shares Listed and Outstanding	Per Cent of Total	Average Volume Trading Weekly	Per Cent of Trading	Ratio* of Average Trading to Stock Outstanding
Curtiss-Wright.....	6,144,591	41.62	130,296	40.55	02.11
Aviation Corp.....	3,182,200	21.55	43,324	13.48	01.35
United Aircraft.....	1,838,910	12.45	97,908	30.47	05.32
Detroit Aircraft.....	887,769	06.01	12,397	03.85	01.18
Fokker Aircraft.....	1,000,000	06.77	8,167	02.55	00.81
Nat'l Air Trans.....	635,060	04.50	18,713	05.83	02.96
Trans. Air Trans.....	590,000	03.5	6,505	02.03	01.10
Aviation Corp. Am....	484,829	02.9	3,951	01.23	00.70

*Percentage of Total Stock Turned Over Weekly

In the construction of the averages, the old Curtiss Aero and Wright Aeronautical have been converted into the equivalent of the present shares. The same has been done with National Air Transport for the first few weeks of the year prior to the appearance of its new stock. Factors have been introduced to care for the absence for the earlier weeks of Aviation Corporation, United Air Transport and Detroit Aircraft.

The charts accompanying this article are all semi-log



Average prices and sales volume, aircraft manufacturing and air transport.

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or "ratio" studies prepared on the same scale. This permits of a true picture of the actual percentage changes in the high and low of each individual stock in exact relation to each of the other issues. By this method all possible distortion is eliminated and it becomes instantly evident when one or another is moving out of line.

In caring for the problem of weighting it may be said, at least for the present, that the selection of this group has automatically eliminated this necessity. All of these issues have shown such high consistency of movement, none displaying more violent counter movements than any of the others, that a simple arithmetical average gives as adequate an index as it would be possible to devise. After considerable study and experiment with a more elaborate index weighted in accord to the proportionate volume of trading activity the result was practically identical with the index as here given.

In chart 3 the total volume of sales of the eight selected issues is given in connection with the average high and lows for each week. At the top of the chart is placed the *New York Times* index of 25 leading industrial common stocks for purposes of comparison. This index is composed of the following: Air Reduction, American Can, Allied Chemical & Dye, American Tel. & Tel., Atlantic Refining, Burroughs, Case Threshing, Du Pont de Nemours, Eastman Kodak, General Electric, General Motors, International Business Machine, International Harvester, International Tel. & Tel., R. H. Macy, National Biscuit, Texas Gulf Sulphur, Union Carbide & Carbon, United Fruit, U. S. Steel, Westinghouse Electric, and Woolworth.

Thus we have a representative list of seasoned American industrial stocks by which to measure the behavior of aviation stocks. It can truly be said of the above list—that as they go, so goes the nation's prosperity.

On the right side of this chart is a percentage measuring scale which discloses that the above named industrials declined from their September 19th peak approximately 54%; whereas the aviation stocks show a decline from their May 11th peak, of 79%. Also of interest, the industrials here show an increase from their November lows of about 50%; whereas the aviation stocks have risen some 58%. In other words, during the brief period of the past fifteen weeks these eight aviation issues have shown more rallying power by 8% than have the veteran and seasoned market leaders. In matter of fact, this entire gain in the air stocks has come within the past eight weeks.

CANADIAN AVIATION

CANADIAN OPERATIONS are closely linked with those both of the United States and of Great Britain. The enormous recent expansion is in part the parallel for that recorded in the United States, in part the result of starting light plane clubs on the British model. The expansion in the amount of flying has been even more spectacular than in the United States, except on the passenger transport side, the number of planes having been multiplied by five and a half, the number of pilots by ten, and the hours flown by six and a half, in two years.

A large part of the increase in operations for the past two years is of course due to the formation of light plane or private flying clubs, the collective record of which is

Commercial Operations

	1922	1923	1924	1925	1926	1927	1928	1929
Firms operating aircraft	23	15	8	8	14	20	53	95
Hours flown	2,541	2,830	4,389	4,091	5,860	12,070	43,071	78,000
Airplane mileage	106,535	47,505	21,700	29,065	30,290	209,583	1,557,917	.....
Seaplane mileage	52,420	119,168	263,288	218,686	356,481	247,238	797,998	.....
Amphibion mileage	26,458	21,425	9,790	8,075	6,332	.....	20,341	.....
Mileage of transport routes	.....	.....	.....	.....	.....	372	1,692	6,210
Passengers carried	4,282	2,238	5,314	4,897	6,436	18,932	74,669	125,000
Mail carried	62,025	.....	1,221	1,080	3,860	14,684	316,631	340,636
Express carried	14,681	17,600	77,385	592,220	724,721	1,098,346	2,404,682	3,700,000
Total miles flown	185,211	188,098	294,778	255,826	393,103	829,010	2,728,414	6,000,000
No. of accidents (all accidents, not merely fatal ones)	7	5	1	0	5	4	18	29
No. of accidents per million airplane miles	37.7	26.5	3.4	0	12.7	4.8	6.6	4.8

Licenses and Certificates

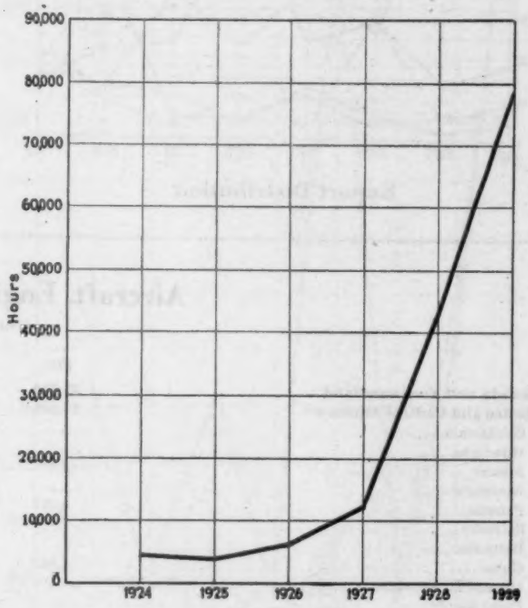
	1922	1923	1924	1925	1926	1927	1928	1929
Licensed airplanes	46	45	10	11	15	36	139	...
Licensed seaplanes	6	4	1	1	..	17	120	...
Licensed flying boats	7	19	20	26	28	21	33	...
Licensed amphibions	1	1	1	1	1	..	4	...
Total licensed aircraft	60	69	32	39	44	74	296	409
Licensed private pilots	70	14	12	18	20	43	258	341
Licensed commercial pilots	69	30	19	18	18	29	70	334
Licensed mechanics (air engineers)	93	186	170	55	65	74	130	305
Unlicensed mechanics employed	20	10	33	32	43	59	85	...

tabulated on this page. Of the total amount of flying done in Canada, the clubs contributed approximately 20 per cent both in 1928 and 1929. Their activities in 1929 were almost exactly double those of the previous year in every respect, except that the number of clubs operating was increased by only 50 per cent and the number of planes by 150. The average number of planes per club has increased from 2.3 to 3.4.

The clubs have of course been a predominant factor in the great increase of private piloting in 1928 and of both private and commercial pilots in 1929, a number of those who learned to fly through the clubs in the previous year having gone on to take commercial licenses.

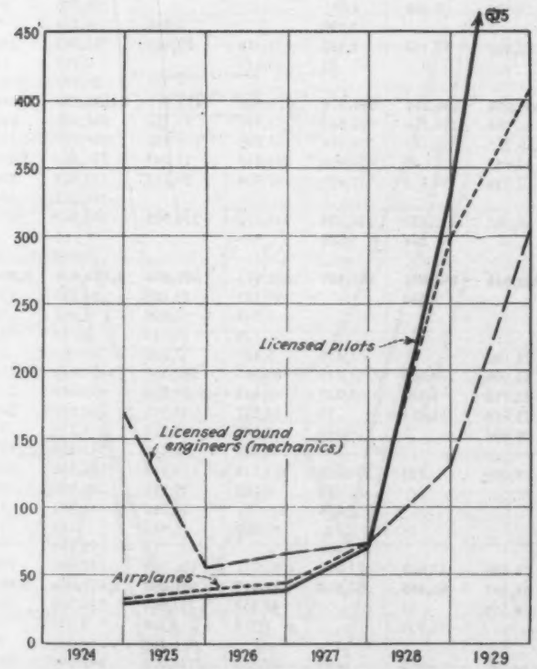
Airports

	1922	1923	1924	1925	1926	1927	1928	1929
Airports (public, state or municipal)	6	5	3	3	4	7	20	31
Airports (private or commercial)	15	12	9	10	10	10	12	8
Seaplane stations (public)	1	2	3	3	4	4	5	13
Seaplane stations (private or commercial)	6	12	9	18	16	15	7	19
Total airports and seaplane stations	28	31	24	34	34	36	44	71



Total flying time, commercial and private.

No figures on Canadian production for 1929 are as yet available, but beyond question the D.H. Moth played the largest part. In 1928 the DeHavilland Company of Canada had approximately two-thirds of the total production of the country. In 1929 it probably increased its percentage. At the end of 1928 almost exactly one-third of all airplanes registered were Moths. On the other hand, at the end of 1928, the total of all American factories made up 60 per cent of the total Canadian registration, the Moth being the only serious competitor of British origin. Eighty planes were exported from the U. S. to Canada in 1929, which was probably not far from the total of all Canadian production.



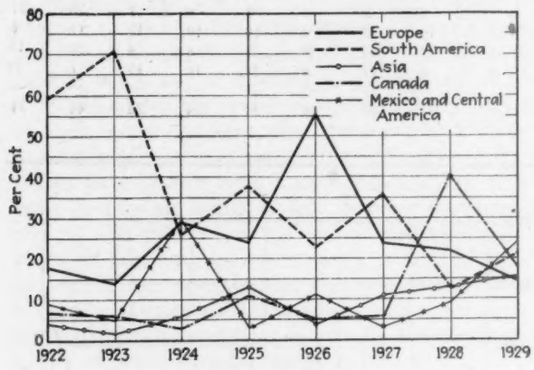
Canadian licensing progress.

Canadian airport development has not exactly followed the lines established south of the border. Leaving aside the seaplane stations which are recognized and formally developed in Canada to an extent as yet almost unknown in the United States, the table indicates that the number of commercial airports operated has remained almost constant for seven years, with an actual decline during 1929, the year of the great boom in airport construction in the United States. Municipal developments, on the other hand, went forward almost as briskly as in the previous year.

The differences are natural, for the effect of the Lindbergh flight was not felt in Canada at it was below the international boundary line. The great factor making for municipal interest in airports in the last two years has been the increase in flying activity, and especially the formation of the flying clubs, all of which had to have fields to serve as bases, and only a few of which have been in a position to purchase land and develop it at their own expense. Also, there was no such flood of enthusiasm for aeronautical finance in the Dominion in 1929 as marked the financial history of the United States in that year.

Government sponsored flying clubs 1928-29

	1928	1929
Number of clubs	15	23
Membership	2,403	5,095
Hours flown	8,125	15,736
Number of planes operated	34	79



Export Distribution

AMERICAN

THE AMERICAN aircraft industry is exporting a steadily increasing proportion of its total production. Measured by total value, about six per cent of the total production went abroad in 1927, about eight per cent in 1928, and nearly fourteen per cent in 1929. Measured in numbers of planes, the corresponding figures were 2.5, 3.5, and 6 per cent. A higher proportion of value than of units is accounted for by the large quantities of aircraft parts shipped abroad and also by

Aircraft, Engine and Parts Exports

(Total Value in Dollars)

	1922	1923	1924	1925	1926	1927	1928	1929	Total 1925–1928
Canada and Newfoundland	**37,558**	**25,249**	**22,163**	**80,205**	**50,061**	**448,475**	**1,403,873**	**1,764,428**	**3,747,042**
Mexico and Central America*	**47,596**	**22,253**	**275,190**	**119,199**	**114,535**	**90,381**	**419,656**	**2,397,852**	**3,141,623**
Guatamala	.....	.....	.....	.....	.....	211	37,917	17,460	55,588
Honduras	.....	6,248	11,550	6,029	793	14,888	11,253	25,358	58,321
Mexico	42,431	9,433	228,220	8,738	85,459	[34,458	236,068	1,851,733	2,216,456
Nicaragua	.....	.....	1,500	.....	17,820	.....	990	7,388	26,198
Panama	4,097	.....	.....	.....	30	4,824	46,699	316,650	368,203
Salvador	.....	5,802	4,500	9,000	4,885	.....	.....	30,916	44,801
Bermudas	.....	.....	.....	.....	2,000	.....	2,850	4,575	9,425
Cuba	1,068	770	29,420	95,432	3,477	25,176	79,321	93,373	296,779
Dominican Republic	.....	.....	.....	.....	71	10,623	.....	2,799	13,473
Porto Rico**	.....	.....	.....	.....	.....	.....	4,558	31,903	36,461
South America*	**201,909**	**307,743**	**208,577**	**298,577**	**234,776**	**671,233**	**477,772**	**2,133,187**	**3,815,544**
Argentina	175,191	45,734	66,184	193,766	32,869	19,399	93,866	507,900	847,800
Brazil	111,255	241,644	60,273	66,185	6,544	17,899	113,226	241,829	445,683
Chile	.....	8,210	12,682	40	56,030	222,448	17,443	771,660	1,066,621
Colombia	.....	676	1,334	34,932	11,439	67,904	29,732	132,863	276,870
Ecuador	.....	.....	.....	.....	.....	.....	.....	188,267	188,267
Peru	463	11,479	68,461	3,430	122,224	343,217	223,505	283,543	975,919
Venezuela	.....	.....	.....	244	5,670	365	.....	55	6,334
Uruguay	5,000	.....	.....	.....	.....	.....	.....	1,800	1,800
Europe*	**90,164**	**62,734**	**233,844**	**184,524**	**568,107**	**452,075**	**807,626**	**1,375,650**	**2,387,382**
Belgium	.....	400	.....	7,000	.....	99,103	14,183	34,885	155,171
Czechoslovakia	.....	.....	.....	.....	.....	4,848	3,890	1,696	10,434
Denmark	.....	.....	.....	.....	.....	120	19,345	2,769	22,234
France	29,747	4,000	14,100	.....	3,450	5,475	7,526	69,162	85,613
Germany	.....	.....	11,000	70,808	11,016	80,369	208,558	417,940	788,691
Italy	.....	12,189	22,716	1,358	3,020	3,498	99,834	131,188	238,898
Netherlands	40,478	45,645	71,628	17,477	25	19,977	83,195	120,641	241,315
Norway	3,000	.....	26,000	.....	250	2,080	1,925	9,753	14,008
Poland and Dansig	.....	.....	.....	.....	.....	4,260	8,149	145,355	157,764
Soviet Russia in Europe	.....	.....	8,600	821	270,739	175,528	155,313	206,740	809,141
Spain	.....	.....	.....	.....	75	4,100	19,051	49,900	73,126
Sweden	.....	.....	.....	.....	7,038	.....	24,366	11,295	42,699
Switzerland	5,000	.....	.....	.....	.....	10,000	5,482	15	15,497
Turkey in Europe	.....	.....	.....	.....	480	.....	.....	19,375	19,855
United Kingdom	11,939	500	79,800	87,060	272,014	42,717	156,209	147,691	705,691
Asia*	**19,202**	**9,300**	**51,187**	**99,499**	**50,978**	**235,747**	**501,084**	**1,477,394**	**2,364,702**
China	17,800	.....	4,590	55	.....	47,857	227,963	720,900	996,775
Java and Madura	.....	.....	.....	11,750	.....	1,217	3,250	3,312	19,529
Hong Kong	.....	9,300	.....	.....	.....	.....	6,162	66,225	72,387
Japan	1,380	.....	46,597	1,918	675	77,819	136,078	448,056	664,546
Philippine Islands	22	.....	.....	83,958	29,578	41,247	88,130	161,332	404,245
Siam	.....	.....	.....	1,818	20,345	38,000	39,501	36,501	136,165
Soviet Russia in Asia	.....	.....	.....	.....	.....	.....	.....	38,000	38,000
Oceania*	.....	.....	.....	**1,621**	**8,337**	**30,455**	**317,564**	**164,918**	**522,895**
Australia	.....	.....	.....	876	7,186	30,455	55,138	20,355	114,010
Hawaii**	.....	.....	.....	.....	.....	.....	256,426	122,694	379,120
New Zealand	.....	.....	.....	745	1,151	.....	.....	13,859	15,755
Africa	.....	.....	.....	**34**	**416**	**3,979**	.....	**19,692**	**24,121**
Miscellaneous***	**8,501**	**6,279**	**6,955**	.....	.....	.....	.....	.....	.....
Grand total	404,930	433,558	797,916	783,650	1,027,210	1,925,344	3,926,975	9,333,121	16,996,300

* Total includes exports to miscellaneous other countries on the continent not included in break-down.

** Figures previous to 1928 are not available.

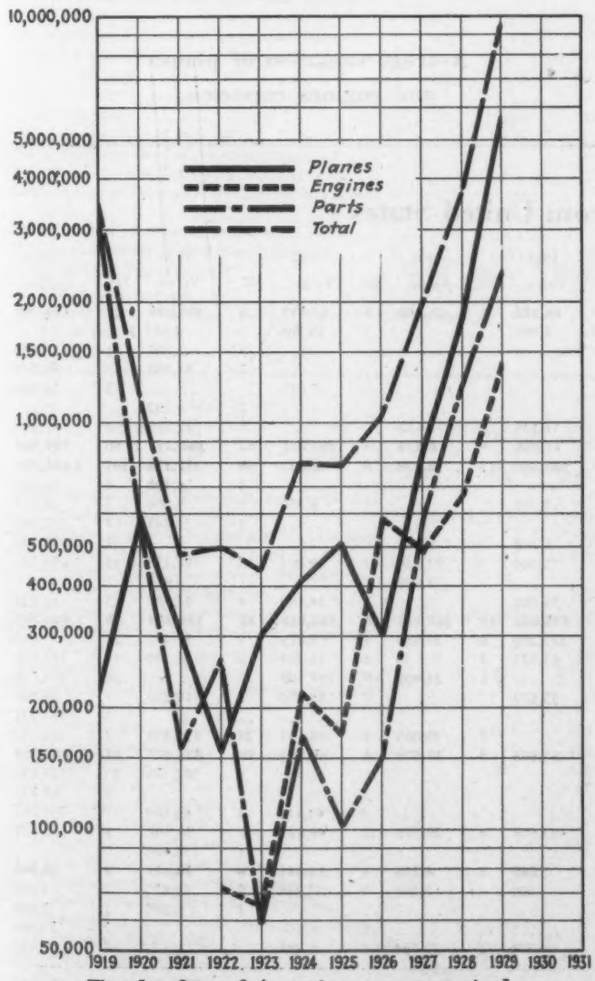
*** This miscellaneous covers the world. The destination of these exports is unknown.

Exports

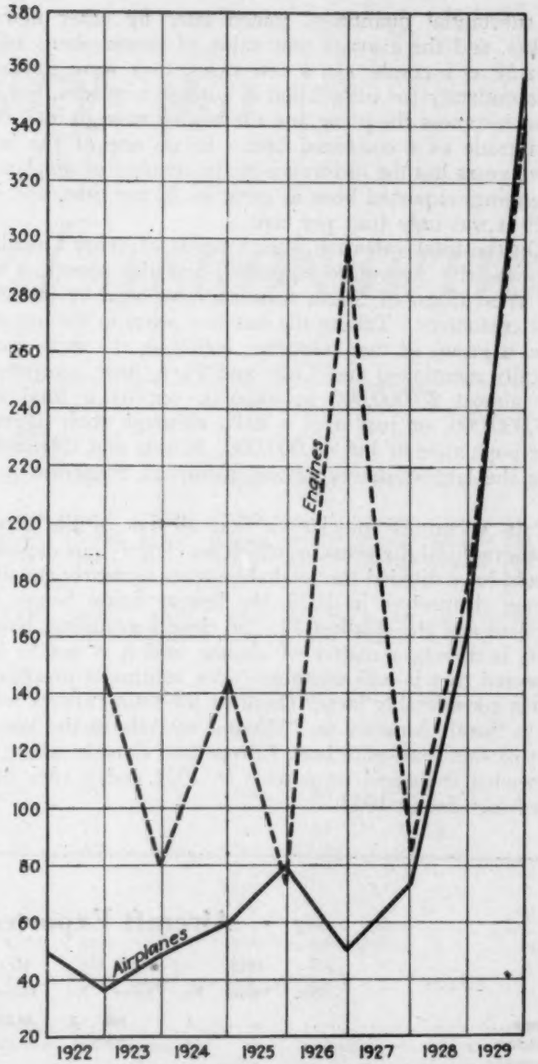
the high average value of the airplanes exported in recent years.

The curve on page 596 is an interesting evidence of the change in the type of exporting. From 1922 to 1926 airplane exports were divded between war surplus and small training and sport and military planes, with the first and last predominating, and mean values arranged around $6,000. The last three years have been the era of air transport, especially in Latin-American countries, and exports have been largely of transport types, with an intermingling of modern pursuit machines. As a consequence the average valuation has more than doubled in 1927 and 1928 and shows a further increase in 1929, this last due principally to transport planes exported to Latin-America. For the first time since 1924 the total Latin-American exports make up more than 40 per cent of the grand total for the year.

Of course the classification of all the shipments as



Total value of American aeronautical exports (in dollars).



Number of airplanes and engines shipped abroad.

"exports," while legally correct, is a little misleading. A great proportion of the transport planes shipped to South and Central America are to be used in the running of transport lines under North American management.

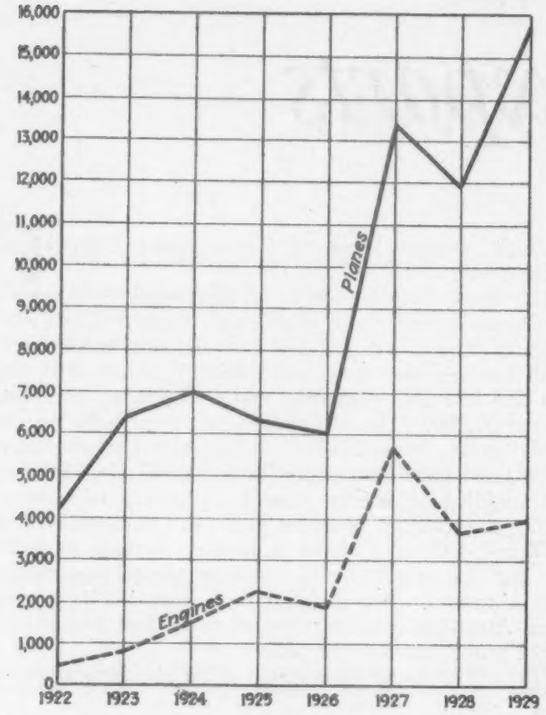
THE CURVE of engine exports is as significant of the type of shipment made as is that for the plane. For eight years after the War, the shipments of engines were almost entirely of war-surplus types, of which America had more to distribute than any other country. OX 5s and Liberties, especially the latter, were in demand for installation in airplanes built abroad, and the number of engine units exported were persistently above the number of planes, while the unit value remained exceedingly low. The zenith was reached in 1926 with a shipment of nearly 300 engines having an aggregate value of less than $600,000. Although there are no statistics on the point, it is a fair guess that at least 80 per cent of the total shipments of that year were Liberties originally sold by the War Department.

In 1927 Whirlwinds and Wasps began to go abroad

in substantial quantities, joined later by other newer makes, and the average unit value of power-plants rose sharply as a result. In a few cases, they were shipped independently for installation in foreign airplanes, but in most instances the plane and the engine now go into export trade as a combined unit. In no one of the last three years has the difference in the number of airplanes to engines exported been as great as 20 per cent, and in 1929 it was only four per cent.

On the total valuation over a series of years Canada, Mexico, the Argentine Republic, and the countries of the West Coast of South America have been by far our best customers. Taking the last five years in the aggregate, a group of five countries, including the three specifically mentioned and Chile and Peru, have accounted for almost $9,000,000 in exports, out of a total of $17,000,000, or just over a half, although their aggregate population is but 45,000,000. Russia and Germany take the largest shares among European countries.

IT IS A curious coincidence that all five of the great geographical divisions by which we classify our exports should have divided the total shipments so nearly equally among themselves in 1929, the largest figure being 24 per cent and the smallest 14. So close a grouping, however, is merely a matter of chance, and it is not to be expected that it will continue. We venture a prophecy that a considerably larger share of the total exports will go to South America in 1930 and to Asia in the latter part of this year, with both Europe and Canada taking a somewhat increased proportion in 1931 and a very decided increase in 1932.



Average valuation of planes and engines exported.

Aircraft Exported from United States

	1922		1923		1924		1925		1926		1927		1928		1929	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Europe	..	.....	1	400	5	34,250	6	18,220	2	12,650	5	45,075	9	121,438	12	190,789
Belgium	..	.....	1	400	..	.....	1	7,000	..	.....	2	28,000	1	4,183	..	.....
Germany	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	1	5,500	1	7,500
Italy	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	2	84,950	5	99,219
Netherlands	..	.....	..	.....	..	.....	..	.....	..	.....	3	17,075	..	.....	3	16,000
Switzerland	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	2	4,532	..	.....
United Kingdom	..	.....	..	.....	5	34,250	5	11,320	2	12,650	..	.....	3	22,263	3	77,080
Canada	1	2,230	5	2,300	3	1,600	15	14,900	9	6,116	26	197,021	62	685,712	80	799,353
Mexico and Central America	23	28,100	10	17,603	21	183,742	15	108,800	11	79,838	5	32,513	30	317,114	107	1,844,291
Guatemala	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	3	36,400	4	10,000
Honduras	..	.....	4	6,100	1	5,162	1	1,000	..	.....	1	8,350	1	9,000	3	22,761
Panama	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	1	23,844	7	112,353
Salvador	..	.....	2	5,802	..	.....	2	8,800	1	4,188	..	.....	..	.....	3	27,840
Mexico	22	19,600	4	5,700	17	150,580	3	5,000	9	73,650	1	10,001	20	190,133	85	1,624,501
Bermudas	..	.....	..	.....	..	.....	..	.....	1	2,000	..	.....	1	2,850	..	.....
Cuba	1	500	..	.....	3	28,000	9	94,000	..	.....	3	14,162	4	54,887	5	46,836
South America	5	108,700	25	278,040	28	185,646	27	273,054	15	147,173	19	466,615	35	340,482	89	1,645,283
Argentina	..	.....	5	30,639	16	59,876	25	177,200	6	29,038	1	8,875	5	55,052	25	375,693
Brasil	5	108,700	13	229,200	4	37,995	10	61,975	1	50	1	16,239	5	66,340	11	184,951
Chile	..	.....	2	8,210	4	12,670	..	.....	1	28,000	7	187,500	..	.....	38	695,750
Colombia	..	.....	..	.....	..	.....	2	33,879	..	.....	2	63,890	1	19,250	3	86,000
Ecuador	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	5	187,237
Peru	..	.....	5	10,000	4	55,105	..	.....	7	90,085	8	190,111	24	199,810	7	115,652
Asia	6	17,600	..	.....	..	.....	5	83,958	4	29,578	4	89,735	18	238,075	51	967,010
China	6	17,600	..	.....	..	.....	..	.....	..	.....	..	.....	9	102,175	23	525,896
Hong Kong	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	6	60,725
Japan	..	.....	..	.....	..	.....	..	.....	..	.....	2	49,112	3	63,000	17	291,767
Philippine Is.	..	.....	..	.....	..	.....	5	83,958	4	29,578	2	40,623	2	34,500	5	88,622
Siam	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	4	38,400	..	.....
Oceania	..	.....	..	.....	..	.....	1	800	4	5,210	3	17,441	8	58,873	9	83,906
Australia	..	.....	..	.....	..	.....	1	500	4	5,210	3	17,441	7	50,872	1	3,600
French Oceania	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	1	6,000	1	7,000
Hawaii	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	7	73,366
Miscellaneous*	2	8,000	7	10,700	2	27,500	1	11,750	5	22,584	1	168	..	.....	9	66,845
Total	37	156,630	48	309,051	59	412,738	80	511,282	50	303,149	63	848,568	162	1,759,653	357	5,606,547

* Miscellaneous figures cover all continents.

AMERICAN *Military* AND *Naval* AERONAUTICS

Army Air Corps

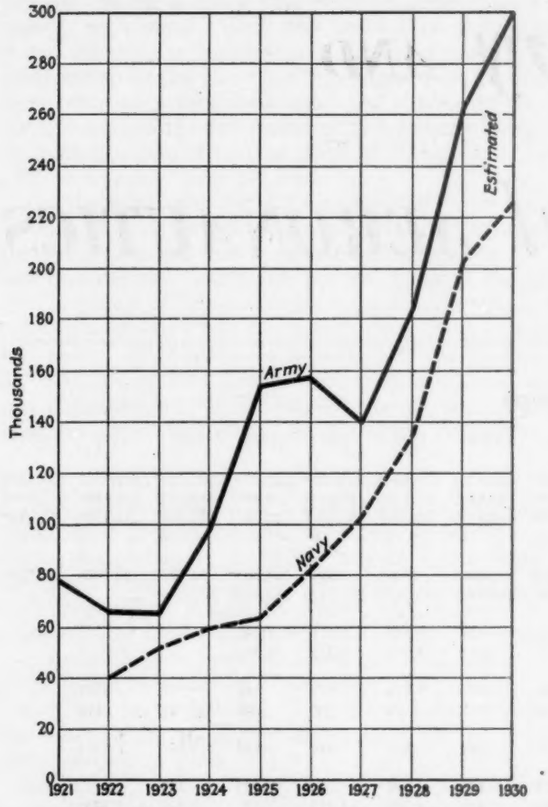
	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931†
Appropriations, direct, total (incl. salaries of civil personnel, office of Chief of Air Corps)	$35,124*	$25,648*	$13,060*	$12,626*	$13,477*	$18,061*	$17,107*	$21,598*	$27,681*	$32,660*	$35,823*
Appropriations—purchase of new planes and engines	$6,000*	$5,500*	$2,053*	$2,646*	$2,646*	$6,550*	$7,604*	$10,488*	$13,342*	$16,189*	$17,574*
Appropriations—experiment and research	$5,250*	$4,300*	$3,500*	$3,000*	$3,081*	$2,730*	$2,200*	$2,264*	$2,200*	$2,256*	$2,256*
No. of new types obtained for trial	30	8	7	2	2	5	0	5	4	.....	.....
Appropriations—new construction and improvements of buildings and stations	.....	.....	$324*	$300*	$300*	$300*	$300*	$1,063*	$1,737*	$3,598*	$2,724*
Expenditures, total, direct and indirect	$62,142*	$47,544*	$36,341*	$39,950*	$40,097*	$45,225*	$53,912*	$53,912*	$57,244*	.....	.....
Personnel strength at end of year											
Officers	.....	890	928	960	944	969	1,019	1,086	.....	.....	.....
Enlisted men	.....	8,350	10,143	8,530	8,972	8,256	9,275	10,311	.....	.....	.....
Qualified commissioned pilots (heavier-than-air only)	645	769	700	696	720	726	779	868	958	935‡	.....
Qualified enlisted pilots (heavier-than-air only)	40	45	50	60	5	76	67	40	34	21‡	.....
Total commissioned and enlisted pilots (heavier-than-air only)	685	814	750	756	785	802	846	908	992	956‡	.....
No. of students graduated from Army flying schools during year	92	261	95	78	213	120	84	135	159	.....	.....
No. of planes on hand June 30	.....	3,349	1,763	1,364	1,432	1,326	1,213	1,104	1,151	1,373‡	.....
No. of planes on hand of war-time design	.....	.....	.....	.....	.....	.....	311	230	169	.....	.....
Reserve officers enrolled and qualified as pilots	.....	.....	.....	.....	.....	4,692	3,699	3,545	3,161	.....	.....
Reserve officers doing periods of active duty during year	.....	.....	.....	.....	.....	.....	1,273	2,243	1,404	.....	.....
Appropriations for Reserve aviation	.....	.....	.....	$21[1]*	$93[1]*	$107[1]*	$517*	$1,125*	$1,352*	.....	.....
Airplanes purchased (during fiscal year)	.....	182	83	210	127	276	315	491	432	.....	.....
Flying hours during fiscal year	77,351	65,214	65,750	97,834	150,319	158,402	140,909	182,903	263,381	299,000[2]	.....

*Thousands omitted.
†Appropriations given as passed by House of Representatives.
‡As of Oct. 1, 1929.
[1]Pay and travel only.
[2]Estimate based on first six months.

Naval Aeronautics

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931†
Appropriations, direct, total (incl. salaries of civil personnel, Bureau of Aero.)	$17,484*	$14,334*	$14,803*	$14,647*	$15,329*	$22,355*	$22,556*	$27,087*	$33,218*	$31,951*	$33,258*
Appropriations—purchase of new planes and engines	.....	.....	$6,937*	.....	$5,265*	$12,305*	$12,362*	$13,447*	$16,385*	$13,441*	$12,326*
Appropriations—experiment and research	.....	.....	$1,117*	.....	$1,573*	$1,630*	$1,928*	$1,729*	$2,000*	$2,000*	$2,000*
Appropriations—new construction and improvements of buildings and stations	.....	.....	280*	.....	$560*	0	0	$1,862*	$895*	$1,248*	$1,449*
Expenditures, direct and indirect, total	$39,817*	$36,549*	$35,348*	$57,828*	$42,034*	$42,361*	$48,282*	$44,379*	$50,482*	.....	.....
Total personnel of naval aviation at end of fiscal year											
Officers	.....	595	600	536	554	670	677	737	843	.....	.....
Enlisted men	.....	4,631	3,716	3,602	3,308	3,877	4,425	11,421[4]	11,642	.....	.....
Naval and Marine Corps flying personnel at end of fiscal year											
Naval officer pilots	.....	314	326	328	382	426	472	466	520	.....	.....
Naval enlisted pilots	.....	91	102	112	98	91	108	141	170[5]	.....	.....
Total Naval pilots	.....	405	428	440	480	517	580	607	690	.....	.....
Marine Corps officer pilots	.....	46	48	43	45	43	55	61	.....	.....	.....
Marine Corps enlisted pilots	.....	.....	.....	6	12	16	14	27	.....	.....	.....
Total Marine Corps pilots	.....	46	48	49	57	59	69	88	.....	.....	.....
No. of airplanes on hand at end of year[1]	.....	.....	616	761	752	837	807	946	.....	.....	.....
No. of non-obsolete airplanes on hand[1]	.....	.....	.....	258[2]	677	411	662	834	829[3]	.....	.....
No. of planes on hand of war-time design	.....	.....	.....	.....	393	329	130	16	.....	.....	.....
No. of planes purchased during fiscal year	.....	.....	.....	.....	150	302	297	313	423	.....	.....
No. of students graduated from navy flying school at Pensacola during year								113	107	.....	.....
Hours flying during fiscal year	.....	39,808	52,586	59,907	63,791	83,228	103,391	137,289	203,198	225,000[6]	.....

*Thousands omitted.
†As given in the budget.
[1]Actual date for these figures ranges from October 1 to December 31.
[2]Obsolescent as well as obsolete types excluded from this total.
[3]July 1.
[4]Increase largely due to commissioning of aircraft carriers Saratoga and Lexington.
[5]Approximate.
[6]Estimated on basis of first six months.

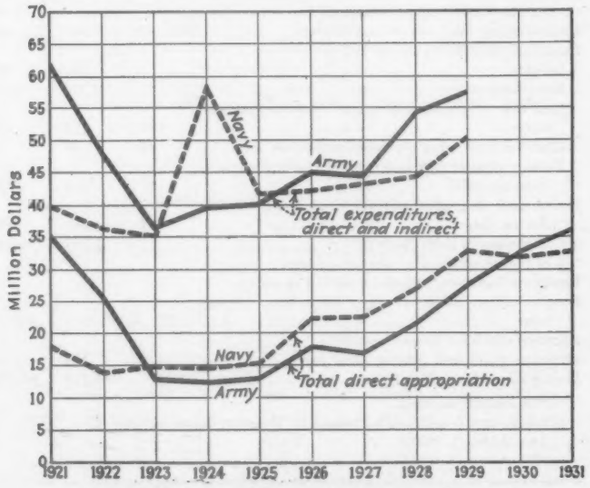


Flying hours per year in the military and naval services.

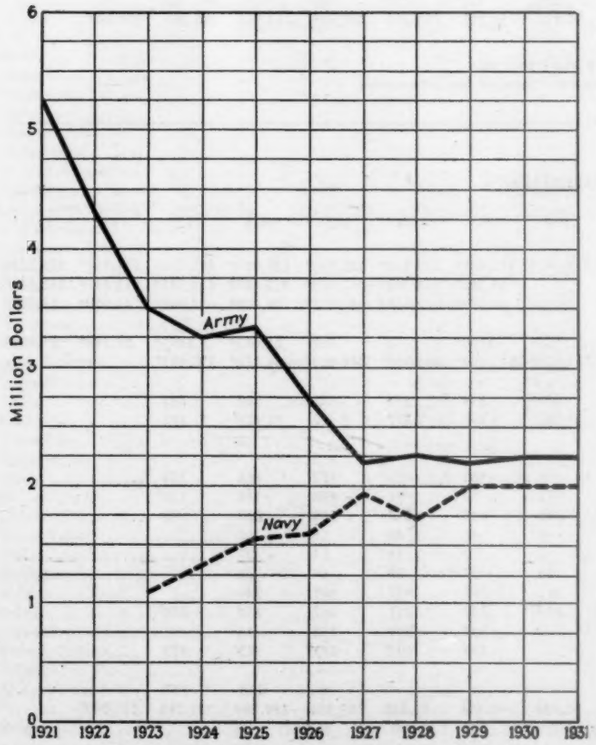
FOR NINE years the direct appropriations for military and naval aviation have run along very nearly parallel. There began with 1926, the first year affected by the Morrow Board's work, an almost steady increase, at an average rate of about $3,600,000 per year for each service. The progress of total expenditures, including those of an indirect nature, has been less steady, the Navy's figures being distorted by the peak in 1924 chargeable to the reconstruction as aircraft carriers of the battle cruisers Saratoga and Lexington.

The amounts of money made available for the purchase of new aircraft have been increasing in the same manner. A disturbing feature of the figures is the failure to secure increased funds for development. For four years now both services have been stabilized at approximately $2,000,000.

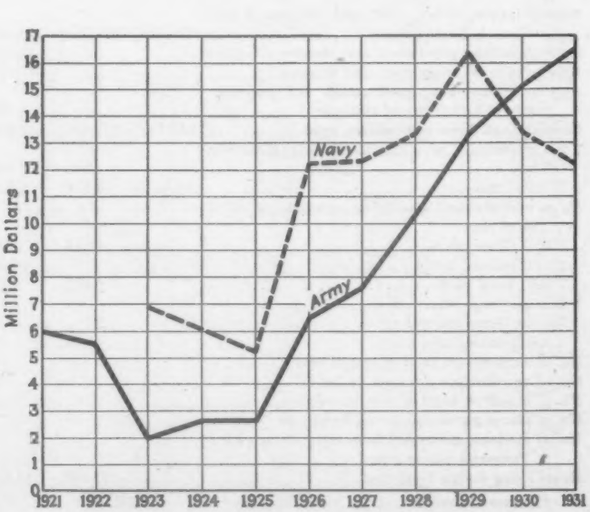
Flying hours have gone up steadily for both services, with never a set-back except for a reduction by the Army in 1927. The Army's flying time remains on the average about 30 per cent ahead of the Navy's each year.



Total direct appropriations and total of all expenditures for military and naval aeronautics.



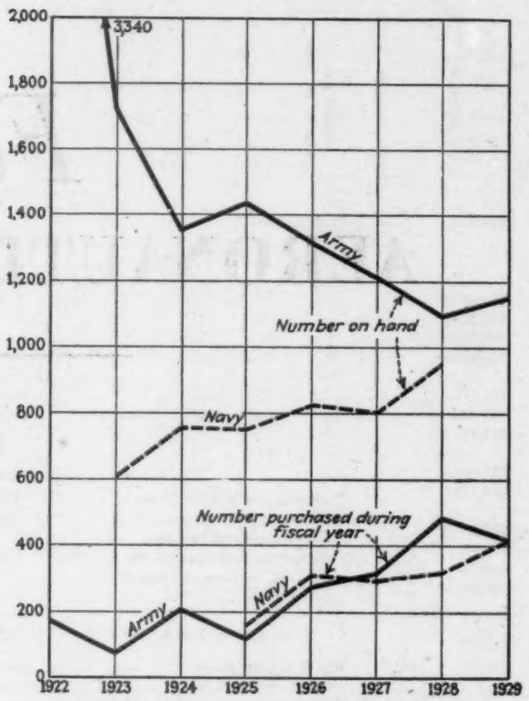
Appropriations for research and experimental development.



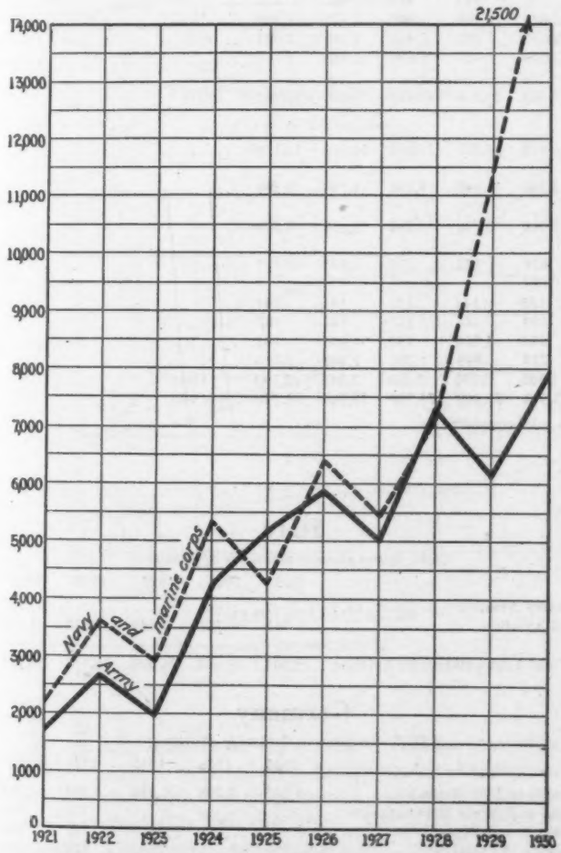
Appropriations for purchase of new airplanes.

THE TOTAL NUMBER of planes on hand for the Army and the Navy has remained approximately constant for four years, and only in the last year has shown an upturn. Prior to that time new purchases were balanced by the gradual disappearance of war-time equipment. As shown by the table on page 597, that has been eliminated very rapidly in recent years. Approximately equal numbers of new planes are purchased each year by the two services.

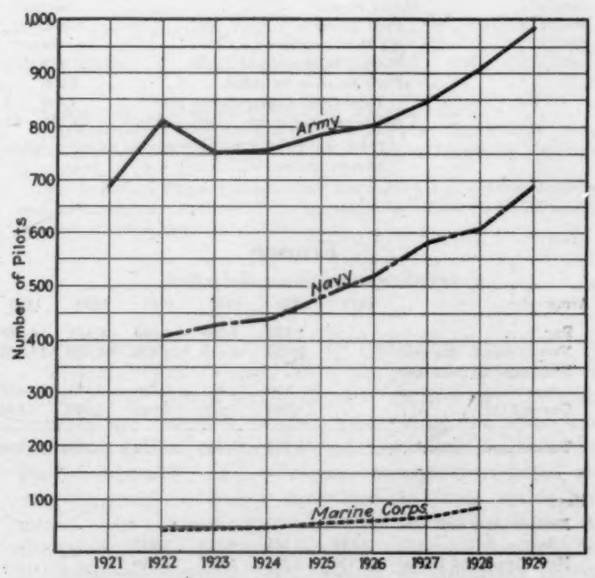
The improvement in safety of military and naval flying, as shown by the table and chart on this page, has been spectacular. It would, of course, be unfair to make direct and minute comparison between the two services, since the conditions of their operations are so widely different. During the fiscal year 1929, the average of the two was better than 8,000 hours per fatal accident, a record which, it can be said with some assurance, has never been equalled by any other military air service in the world. The first six months of the fiscal year 1930 promise a most spectacular further improvement.



Numbers of airplanes on hand and purchased annually.



Flying hours per fatal accident in U. S. Army and Navy.



Numbers of qualified airplane pilots, both commissioned and enlisted.

Accident Data

Fiscal year	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930 (First 6 Months)
No. of fatalities										
Army	.....	.....	.....	.....	.....	.....	.....	.....	61	.....
Navy and Marine Corps	.....	31	24	18	34	17	26	35	30	.....
Hours of flight per fatal accident										
Army	1,718	2,717	1,992	4,253	5,183	5,866	5,032	7,316	6,125	7,872
Navy and Marine Corps	2,191	3,619	2,921	5,335	4,253	6,402	5,436	7,226	11,289	21,510

Foreign
AERONAUTICAL ACTIVITIES

Great Britain

(All figures given in thousands of dollars)

Technical and Warlike Stores	1923–4	1924–5	1925–6	1926–7	1927–8	1928–9	1929–30	1930
Planes, engines, spares	17,600	24,900	28,500	26,000	28,700	27,600	30,750	.....
Experiment and research	172	195	180	462	462	602	550	.....
Armament and ammunition	1,230	1,885	2,020	2,000	1,900	1,575	1,460	.....
Airships, balloons, equipment	44	1,980	2,640	1,875	2,400	2,340	2,075	.....
Gas and oil	1,875	1,930	2,230	2,420	2,680	2,540	2,730	.....
Total Appropriation (Net)*	18,950	29,500	27,500	29,650	31,450	32,000	32,100	.....
Pay of the Air Force								
Total Appropriation	17,400	14,250	16,610	16,575	15,390	16,570	16,150	.....
Works, Buildings and Lands (Military)								
Total Appropriation	8,750	10,300	12,500	11,400	9,250	8,290	8,290	.....
Air Ministry (Administration, etc.)								
Total Appropration	3,150	3,450	3,660	3,710	3,340	3,190	3,210	.....
Meteorological Services								
Total Appropriation	871	652	638	657	730	1,085	1,115	.....
Civil Aviation								
Civil Airports	190	175	170	148	136	141	141	.....
Air Route Survey	78	166	180	146	151	141	107	.....
Works, Buildings, and Lands	138	720	600	1,050	730	450	146	.....
Civil Aviation Subsidies	1,000	668	775	875	1,200	1,300	1,815	.....
Total Civil Appropriation (Net)*	1,390	1,720	1,800	2,250	2,260	2,040	2,190	†4,000
Total Appropriation for Aviation (Net)*	58,700	72,250	75,500	77,900	75,700	79,000	78,750	†83,000

*Money derived from other appropriations is deducted from total expenditures.
†Approximate.

France

(All figures given in thousands of dollars)

Army	1925	1926	1927	1928	1929	1930
Pay	.....	2,300	3,000	4,300	6,660	8,580
New Planes & Engines	.....	9,850	16,610	16,420	22,500	19,800
Buildings and Improvements	.....	980	1,935	1,760	4,175	5,460
Gas and Oil	.....	1,450	1,675	1,960	2,600	4,050
Total Appropriation*	.....	15,500	23,300	25,100	36,000	37,900
Navy						
Replacements and Upkeep	2,340	2,275	2,525	4,430	.....	.....
New Planes and Bases	2,420	1,295	1,375	3,390	.....	.....
Total Appropriation Excluding Pay*	4,760	3,570	3,900	7,820	.....	.....
Civil						
Navigation and Meteorological Service	606	245	284	552	750	880
Experiments and Research, Technical and Industrial Service	2,190	1,790	2,195	2,325	5,410	4,860
Subsidies to Transport Companies	2,030	2,360	3,060	4,700	6,750	8,200
Total Appropriation*	6,090	5,380	6,600	8,660	12,200	14,000
Total Appropriation for Aviation	.....	24,100	33,800	41,600	62,000	69,150

*Insofar as itemized in the budget.

Italy

(All figures given in thousands of dollars)

	1925	1926	1927	1928	1929
Military Aviation	.....	.....	.....	.....	35,565
Civil Aviation	365	721	1,620	1,870	3,158
Total Appropriation for Aviation	24,800	29,610	36,520	36,520	38,723

Germany

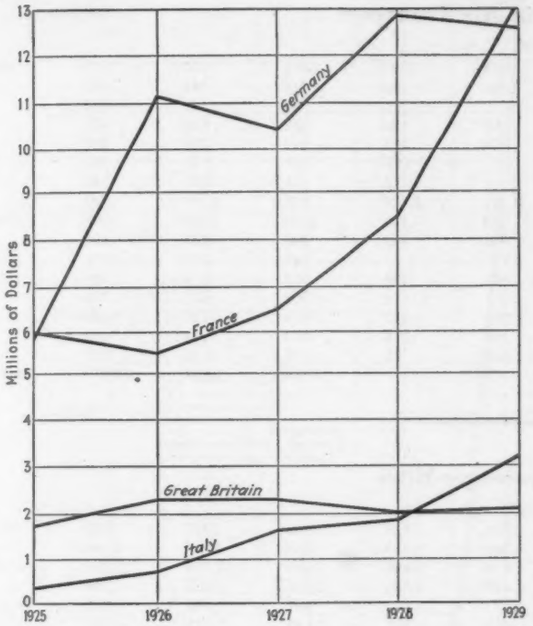
(All figures given in thousands of dollars)

	1925	1926	1927	1928	1929
Subsidy to Luft Hansa	1,595	3,708	5,250	4,800	2,380
Radio and Safety Development	.....	.....	.....	334	425
Research and Experiment	.....	.....	.....	381	381
Training of Personnel	.....	.....	.....	870	476
Airport Development	.....	.....	.....	250	131
Total Appropriation	5,750	11,150	10,430	12,050	6,675

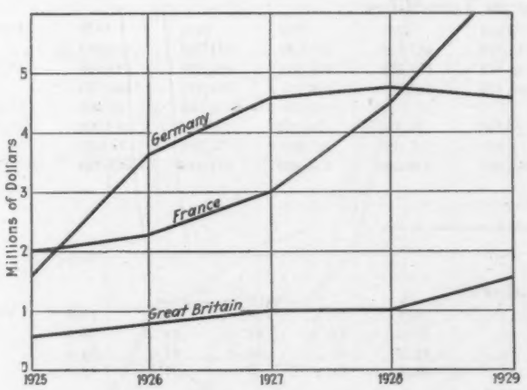
The Netherlands

(All figures given in thousands of dollars)

	1925	1926	1927	1928	1929	1930
Civil aviation						
Airway development	40	32	34	43	54	59
Experiment and research	38	42	40	41	46	50
Subsidy to K.L.M.	120	120	200	240	210	160
Purchase of K.L.M. shares	0	0	40	80	480	600
Total	198	195	314	406	792	882
Military aviation	....	....	....	....	....	486
Naval aviation	....	....	....	....	....	165



Total appropriations for civil aviation.



Direct subsidies to air transport.

Military Aviation.

Country	Officers	Men	Planes in 1st Line Tactical Units	Reserve Pilots	Appropriations (Dollars)
Argentina	.....	.....	84	.....	.....
Belgium	.....	1,240	246	.....	6,650,000
Bolivia	.....	.....	20	.....	.....
Brazil	.....	.....	200	.....	.....
Great Britain, Northern Ireland	2,492	20,187	772	625	93,000,000
Australia	145	890	.....	.....	1,680,000
Canada	52	239	26	.....	1,697,000
India	224	1,789	96	.....	8,314,000
Irish Free State	22	133	12	.....	.....
New Zealand	109	36	.....	.....	211,000
U. of S. Africa	27	256	12	.....	632,000
Chile	.....	.....	*72	.....	172,000
Cuba	19	169	.....	.....	.....
Czechoslovakia	238	.....	.....	.....	2,015,000
Denmark	——95——		.....	.....	212,000
Ecuador	7	25	.....	.....	.....
Finland	132	1,123	.....	.....	582,500
France and Colonies	.....	.....	*1,620	.....	35,200,000
Greece	.....	144	.....	.....	168,000
Italy	1,708	26,423	875	.....	32,250,000
Japan	.....	....	*372	.....	.....
Lithuania	.....	.....	74	.....	.....
Mexico	153	207	.....	.....	362,500
Netherlands	65	455	70	16	972,500
Dutch Indies	27	245	30	.....	.....
Peru	.....	.....	*12	.....	.....
Poland	.....	.....	*325	.....	2,090,000
Portugal	103	1,045	42	.....	.....
Romania	.....	.....	*72	.....	.....
Jugoslavia	.....	.....	*192	.....	3,160,000
Spain	.....	.....	*336	.....	3,590,000
Morocco	.....	.....	*36	.....	362,000
Sweden	.....	.....	.....	.....	2,140,000
Switzerland	——207——		.....	.....	375,000
United States	1,852	21,179	857	4,019	56,772,000

*Approximate figure, derived from number of tactical units.

Figures are for the latest year available, in most cases 1928 or 1928-29. Most of the figures are deduced from the League of Nations Armaments Year-Book for 1928-29.

Appropriations in England, France, Italy, and one or two other countries having separate Air Forces include pay. In the figures for the United States and most of the other countries, pay is not included.

DATA on the development of military aviation are hard to secure. No European or Asiatic country is so lavish with information on operations, equipment, and personnel as are our own War and Navy Departments. The figures presented above and the budgets on the opposite page are the best index of military activity that can be offered.

In presenting the budgetary figures, conversion into dollars has in all cases been made at present exchange rates. Most of the tables are not extended back far enough to strike the era of violent exchange fluctuations, when intelligible conversion from one currency into another was almost impossible.

Comparisons between countries must of course, be made with great care, both because of the varying price levels and because of the varying scope of "aeronautical" appropriations. Thus, the air force appropriations in France and Great Britain cover the pay of personnel, but those in the United States do not. British civil aviation expenditure includes the development of the airport at Croydon, a charge which in America would be borne by the municipality. The German expenditures listed are supplemented by many contributions from states and cities. The German national budget for civil aviation, on the other hand, is inflated by the inclusion of a number of items of research, etc., which, in countries having an air force, would be a military charge.

AIR TRANSPORT is expanding gradually in Europe, retarded by direct subsidy policies, and with dizzy rapidity in the United States. The amount of flying done on transport lines, the amount of passenger traffic, and the amount of express and mail traffic, have all increased in a larger ratio in the United States in the last two years than in France, Germany, Great Britain, or the Netherlands in the last seven. In 1929 it appears, estimating the figures for those European countries from

Annual Airplane Mileage in Air Transport

(Thousands omitted)

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
Australia	.....	.....	.....	.....	263	358	417	344	412	.....
Belgium	.....	.....	.....	.....	.....	.....	90	111	230	.....
Colombia	.....	54	128	184	168	182	302	328	577	.....
Czechoslovakia	.....	.....	.....	.....	129	173	152	258	257	.....
Denmark	.....	.....	.....	.....	.....	127	127	117	92	96
Finland	.....	.....	.....	.....	.....	32	58	105	163	.....
France	530	1,461	1,738	2,104	2,264	2,928	3,240	3,751	4,345	.....
Germany	298	1,028	748	448	984	3,076	3,900	6,190	6,345	1,888[1]
Great Britain	644	225	717	943	936	862	840	873	1,024	.....
Italy	.....	.....	.....	.....	.....	.....	325	815	1,236	1,635
The Netherlands	51	217	246	335	490	599	555	814	1,008	1,233
Poland	.....	.....	.....	.....	.....	.....	532	672	260	.....
Russia	.....	.....	83	158	312	555	815	1,127	1,684	.....
Sweden	.....	.....	.....	.....	100	216	212	204	200	.....
Switzerland	.....	.....	.....	.....	102	87	195	196	330	.....
United States	.....	.....	.....	.....	.....	.....	**4,429**	**5,810**	**10,472**	**20,242**

Passenger Traffic in Passenger-Miles

(Thousands omitted)

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
France	382	2,562	2,165	2,600	3,338	3,895	4,090	4,795	6,160	.....
Germany	598	1,028	1,165	1,282	2,030	6,600	9,090	16,720	17,820	3,160[1]
Great Britain	1,305	1,270	2,220	3,010	2,620	2,645	3,746	4,028	6,380	.....
Italy	.....	.....	.....	.....	.....	.....	657	1,997	3,485	4,400
The Netherlands	78	383	275	920	905	1,300	1,540	3,220	4,220	4,355
Russia	.....	.....	83	185	510	750	1,150	1,170	2,690	.....
United States	.....	.....	.....	.....	.....	.....	**983**	**3,400**	**15,350**	**48,000**

Express and Mail Traffic in Ton-Miles

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
France	24,980	84,100	192,300	284,500	337,500	405,000	389,300	431,000	639,000	.....
Germany	2,000	5,030	11,400	7,320	28,410	122,000	213,000	466,500	597,500	141,000
Great Britain	30,900	4,400	42,500	64,300	104,200	147,567	159,031	135,882	246,500	.....
Italy	.....	.....	.....	.....	.....	.....	10,500	36,000	70,000	132,000
The Netherlands	6,300	10,240	25,300	38,400	44.600	66,500	74,100	125,400	194,000	251,000
Russia	.....	.....	4,600	8,400	13,300	25.600	28,000	57,000	76,000	.....
[1]**United States**	**117,000**	**291,000**	**302,000**	**326,000**	**242,000**	**146,500**	**270,800**	**574,600**	**1,082,000**	**2,458,000**

[1] First 5 months of year only.

Per Cent of Regularity

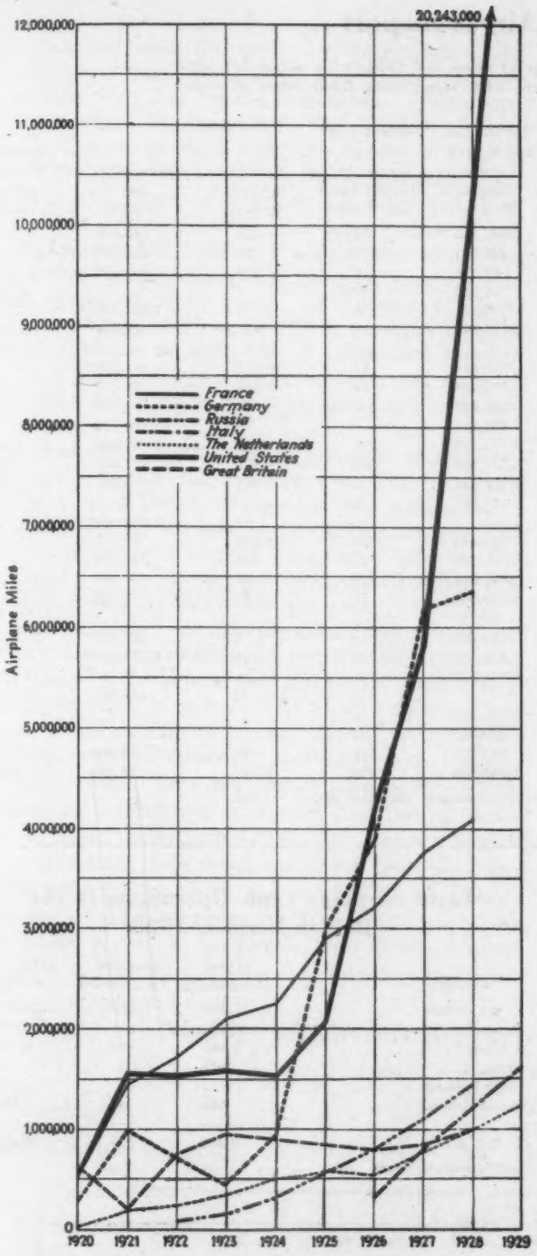
Country	Basis of Calculation	1924	1925	1926	1927	1928	1929
Great Britain	Percentage of scheduled trips completed without stop	72.6	74.2	84.9	84.2	88.0	....
	Total percentage of scheduled trips completed	78.3	80.3	90.4	92.0	94.0	....
	Percentage of started trips completed	98.5	98.6	98.8	99.0	98.8	....
France	Percentage of scheduled trips completed on time or with delays not exceeding 100 per cent of the scheduled time	....	....	....	....	88.7	....
Germany	Total percentage of scheduled trips completed	84.4	89.7	95.2	89.6	90.4	....
Italy	Percentage of scheduled trips completed on time or with delays not exceeding 100 per cent of the scheduled time	....	....	....	....	84.8	....
	Percentage of started trips completed	....	....	....	95.7	97.8	....
Netherlands	Percentage of scheduled trips completed	8.71	88.2	90 4	94.1	96.1	93.3

It will be observed that the above figures are determined on varying bases. The American reliability calculations (given for the air mail on another page) are based on percentage of scheduled mileage flown, which corresponds approximately to the second group of figures in the British table and to those given for Germany and the Netherlands.

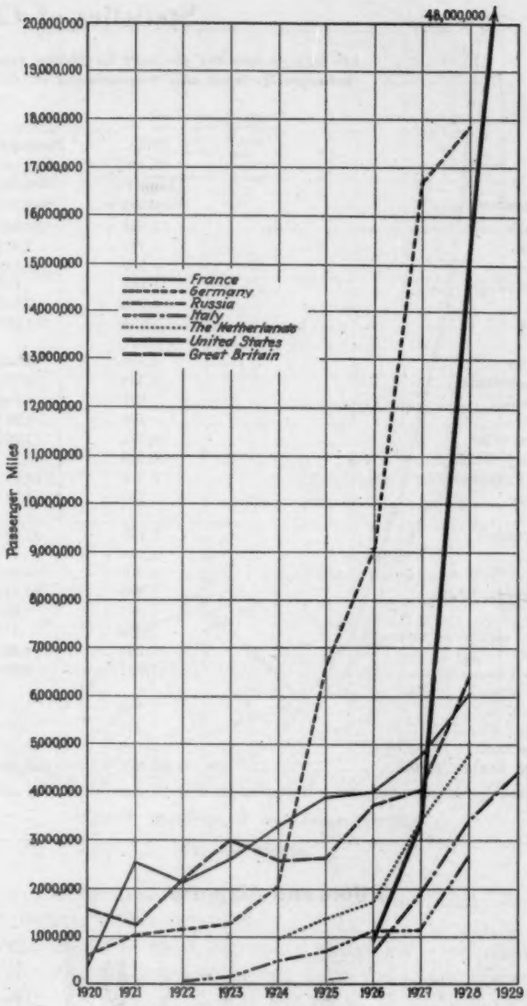
which no returns have as yet come in, that the aggregate transport mileage flown under American control in 1929 was almost exactly to the total for all of Europe. The same relation holds for passenger traffic. For mail and express traffic combined, however, the United States appears to have a distinct lead, of the order of six per cent, on the entire European continent.

Although, as was indicated on page 601, budgetary figures must be compared with caution, there is a certain interest in the calculation of the total civil aviation outlay per mile flown by transport planes. For Great Britain it is approximately $2.00, for France the same, for Germany about $1.50 average over the last three years, for Italy $1.75, and for the United States, counting in the Post-office Department's estimated operating loss on the air mail service, about 70 cents.

The differences in regularity of service among the several countries are less than might be expected, considering the widely different types of organization and the varying inherent difficulties of the routes flown. Taking the percentage of scheduled trips completed as a measure of reliability, since that is the ratio available for the largest number of countries, the average for the last four years is found to be 94.5 per cent for The Netherlands, 92.3 for the United States (figured on a slightly different basis which might raise the average about 0.3 per cent as compared with the European ones), the same for Great Britain, and 91.0 for Germany.



Total Air Transport Mileage Annually.



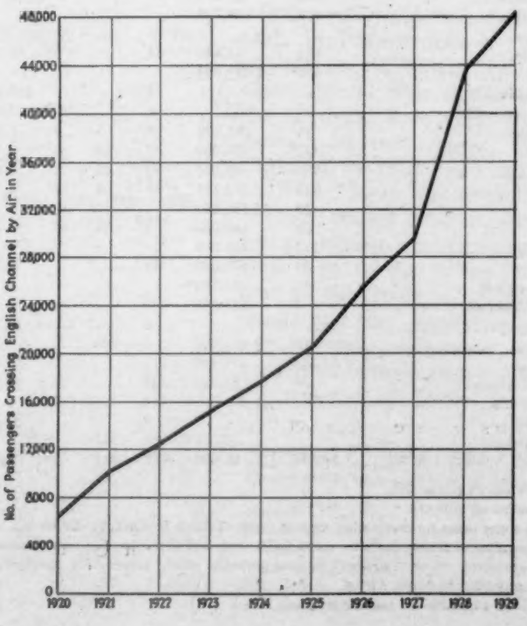
Passenger Traffic.

Commercial Efficiency

(Per Cent of Total Capacity of All Scheduled Planes Occupied by Passengers)

	1927	1928	1929
France.....	....	43.1	....
Italy.....	43.3	45.1	42*
Netherlands ...	....	47.6	49.0

*Approximate.



At right—Passengers Flying English Channel each year. For the first two months of 1930 the total was 2,729, as against 2,031 in 1929 and 2,226 in 1928.

Statistics of Civil Air Transport

All figures are for the last available year, most of them for 1928, with a few for 1929 (principally from the Department of Commerce, with some data from other sources)

Country	Miles of Air Lines in Operation	Passengers Carried (Regular Service)	Lb. of Mail and Express Carried (Regular Service)	Number of Aircraft Employed in Regular Transport Service	Total Number of Civil Aircraft	Population per Airplane	Estimated Production of Civil Aircraft
Australia	3,605	28,962	141,755	34	120	48,000	.....
Austria	1,137	5,477	229,821	9	30	216,500	.....
Belgium	370	1,543	40,516	10	14	546,000	.....
Belgian Congo	2,195	735	124,822	33	.....	.....	0
Bolivia	2,130	2,963	128,671	8	8	1,062,750	0
Canada	1,654	74,689	2,721,313	...	409	22,600	90
China	.....	.....	.....	...	.....	.....	12
Colombia	1,774	2,667	530,414	15	17	344,000	0
Czechoslovakia	1,379	6,231	110,400	31	141	96,750	.....
Denmark	181	1,740	100,420	4	23	113,700	0
Finland	268	3,201	104,431	4	9	370,720	0
France (1928)	11,542	21,000	4,352,280	241	860	45,600	1,440[1]
Germany (1928)	18,540	120,711	5,541,300	200	538	111,000	352
Great Britain (1928)	2,322	19,935	1,318,544	15	462	93,000	204
Hungary	373	2,293	109,251	8	.....	.....	0
India	.....	.....	.....	...	19	17,000,000	0
Italy (1929)	7,950	23,100	549,025	54	1,000	39,659	475[1]
Japan	1,328	270	119	26	108	746,000	.....
Mexico (1929)	6,570	3,500	20,000	59	83	171,500	.....
Netherlands (1929)	1,890	19,129	2,122,000	21	33	211,200	.....
Persia	1,095	2,800	84,537	7	.....	.....	0
Peru	2,350	517	24,000	10	18	308,000	0
Poland	1,231	6,585	548,395	20	24	1,172,000	.....
Russia	7,022	7,079	375,622	...	.....	.....	.....
South Africa	.....	.....	.....	...	32	280,000	0
Spain	730	1,027	25,617	6	.....	.....	.....
Sweden	711	14,948	233,361	8	.....	.....	.....
Switzerland	2,105	14,283	342,593	19	43	90,400	25[1]
United States (1929)	**36,982**	**165,263[2]**	**7,006,930**	**619**	**9,747**	**11,210**	**5,357**

[1]Military production included. [2]Including members of crew other than pilots. Actual passengers estimated about 135,000.

Pilots and Airports

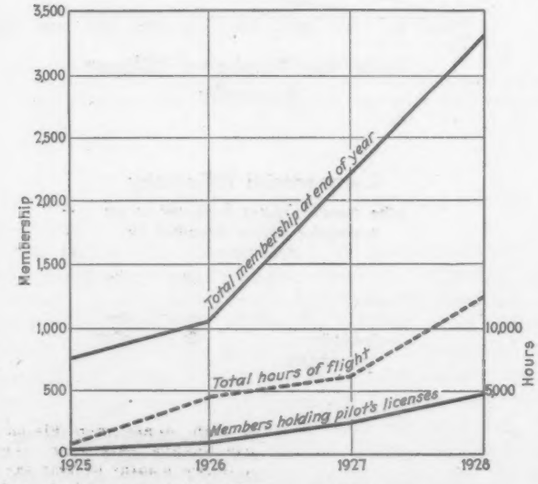
Country	No. of Licensed Civil Pilots	Population per Pilot	No. of Airports[3]	No. of Emergency or Secondary Fields	No. of Military Fields	Sq. Miles per Available Field (All Types)
Argentina	382	25,000	17	...	..	68,750
Australia	422	13,700	...	...	..	.....
Belgium	.....	.....	5	...	9	840
Canada	675	13,640	68	...	..	55,000
China	400[2]	1,089,000	...	...	..	.....
Colombia	.....	.....	1	...	..	440,846
Czechoslovakia	.....	.....	6	...	13	2,850
Denmark	23	148,700	3	3	3	1,840
France	142[1]	276,000	19	18	18	3,870
Germany	857	69,000	33	68	..	1,800
Great Britain	821	52,250	34	8	38[4]	1,111
India	28	13,450,000	...	...	..	.....
Italy	62[1]	640,000	2	98	45	825
Japan	213	378,000	...	...	..	.....
Mexico	84	184,000	39	...	..	19,650
Netherlands	45	155,300	...	...	..	.....
New Zealand	4	323,900	...	...	..	.....
Peru	.....	.....	6	...	..	88,481
Poland	17[1]	1,616,000	6	20	..	5,770
Russia	784[2]	174,100	...	...	..	.....
South Africa	78	88,750	25	...	..	18,900
Spain	.....	.....	44	...	12	3,490
Sweden	.....	.....	4	...	..	43,320
Switzerland	.....	.....	18	17	..	456
United States (2/1/30)	**10,215**	**11,000**	**969**	**511**	**80**	**1,960**

[1]Transport pilots only.
[2]Including military.
[3]In some cases no distinction among types of fields is made in the listing, and this heading probably includes some fields with but little permanent equipment. The standard of an "airport" is undoubtedly much higher, for example, in Germany than in South Africa.
[4]35 are available for regular civil use.

Light Airplane Club Operations in the British Empire, 1928

Country	Total Membership	Qualified for Licenses	Hours of Flying
Great Britain	3,288*	475*	12,201*
Australia	2,500	124	8,006
Canada	2,403	139	8,125
India	271	...	.....
New Zealand	.....	...	.....
South Africa	806	41	2,366
Totals	9,268	779	30,698

*Subsidized Clubs only.

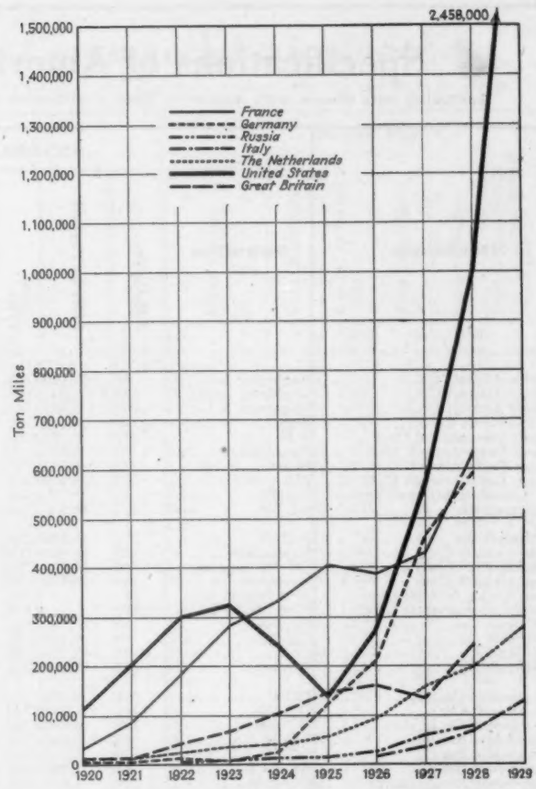


British Light Plane Club Activities

GENERAL RECORDS of aerial activity, as given in the two tables on page 604, show a striking tendency to develop the world map of airplane ownership and operation in parallel with that for the automobile. The population per airplane is smallest for the United States, precisely as for automobiles, although not by so large a margin. Next come British Dominions, especially Canada, again in accordance with automobile precedent. The only distinctive departures from the development of the private highway vehicle are in the relatively low place taken by Great Britain among European nations, and the very high record made by Italy. In the case of Italy, however, it is almost certain, and it is very probable in the French instance as well, that a substantial number of the "civil aircraft" included in the total are actually machines used by military reservists as such and maintained by the government.

While production figures are exceedingly incomplete, it seems probable that the aggregate number of planes built in the United States during 1929 was somewhat in excess of that for all the rest of the world, and that the number of purely commercial machines built in the United States and Canada exceeded the number for Europe and Asia by at least 200 per cent.

The accident record of the countries from which any satisfactory data are available are remarkable chiefly for the uniformity of the several national performances over a considerable term of years. The United States, Germany, and Great Britain all lie within a fifteen per cent range on passenger fatalities per million passenger miles. A year ago it would have been impossible to make that observation, as British air lines then had behind them a record of four years, with 17,000,000 passenger-miles of flying, absolutely free from passenger fatality or indeed from appreciable injury, but in 1929 they had several disasters. The progress made in improving the average safety record of passenger lines in the United States last year was very satisfactory, and was the more remarkable because of the many new lines that were being rather hastily organized.



Total mail and express traffic on air lines.

Aerial traffic in most European countries is primarily with passengers, as it soon would be in the United States if the trend of 1929 were to continue. In Germany the passenger traffic runs to approximately 75 per cent of the total, in Great Britain to a little over 70, in Italy to 80. Only in France does it fall as low as 50, having clung close around that figure on the French lines for five years. In most cases, the combined express and mail traffic is 75 per cent or more express, the air mail business being almost insignificant. This is partly due to the fact that all the flying is international, and the formalities of international shipment of goods encourage express at the expense of parcel post.

Number of Aircraft Registered

	1922	1923	1924	1925	1926	1927	1928
Great Britain	132	192	184	215	268	353	462
Germany, transport types	50	72	107	142	168	194	200
Germany, total	125	145	249	324	416	538	....
Number of British civil pilots licensed	96	135	140	207	286	490	821

Accidents

Passenger Fatalities per Million Passenger-Miles

	1922	1923	1924	1925	1926	1927	1928	1929	Average of Last Five Years
Great Britain	0.00	1.00	2.67	0.00	0.00	0.00	0.00	1.43*	0.44
Germany	....	....	....	....	0.44	0.54	0.22	....	0.39**
United States	....	....	....	....	....	**0.59**	**0.85**	**0.30**	**0.41****

*Approximate. **3 years only.

Forced Landings

Airplane Miles per Forced Landing (All Causes)

	1922	1923	1924	1925	1926	1927	1928
Great Britain	3,910	2,860	3,125	2,630	2,443	2,310	2,850
Germany	.....	.....	.....	.....	.....	6,580	5,750

Airplane Miles per Forced Landing from Mechanical Causes

	1922	1923	1924	1925	1926	1927	1928
Great Britain	19,450	11,050	7,950	7,740	6,780	9,920	9,680
Germany	.....	.....	.....	.....	.....	18,000	15,450
Italy	.....	.....	.....	.....	.....	22,000*	.....

*Quite approximate.

Number of Radio-Equipped Airplanes Operating in European Countries in the summer of 1929

Belgium	5
France	114
Germany	142
Great Britian	20
Netherlands	17
Switzerland	7

Specifications of American Commercial Airplanes

Including only planes with Approved Type Certificates—*AVIATION* does not assume responsibility for the figures given

Manufacturer	Designation	GENERAL: A.T.C. No.	Price at Factory	Type	No. of Seats	Span	Length Overall	Height Overall	POWER PLANT: Make Engine	Total Rated Hp.	R.p.m. at Rated Hp.	Fuel Cap. (Gal.)	Normal Range	Fuel Consumption at Cruising Speed Gal. per Hr.	Make of Prop.
Alexander Aircraft Co.	Eaglerock A-2	58	$2,000	OBL	3	36′ 8″	24′11″	9′11″	OX-5	90	1,400	46	435	10.3	.....
Alexander Aircraft Co.	Eaglerock A-12	139	5,247	OBL	3	36′ 8″	24′ 2″	9′10″	Co	150	1,800	59	590	9.2	Me
Alexander Aircraft Co.	Eaglerock A-15	190	3,907	OBL	3	36′ 8″	25′11″	9′10″	K	90	1,825	39	560	5.0	W
Alliance Aircraft Corp.	Argo	178	4,500	OBL	2	28′ 8″	20′ 2″	9′ 1″	Hw	115	.....	35	425	8.0	StS
American Aeronautical Corp.	S-56	287	7,000	OBA	3	34′ 1″	25′	10′ 1″	K	90	1,825	28	250	7.0	P
American Eagle Aircraft Co.	Touroplane	119	5,795	CML	3	37′	24′	8′	K	90	1,825	32	500	6.4	StS
American Eagle Aircraft Co.	Phaeton, R-540	282	6,795	OBL	2	31′	23′ 6″	9′ 5″	Wr J 6	165	2,000	42	500	8.8	StS
American Eagle Aricraft Co.	201	293	3,995	OBL	3	31′ 1″	21′11″	.....	K	90	1,825	.....	.....	.....	.....
Arrow Aircraft & Motors Corp.	A2-60L	115	3,131	OBL	2	25′10″	19′ 3″	7′ 5″	Lb	60	1,950	16	200	6.0	Hs
Bach Aircraft Co.	3-CT-8	172	39,500	CML	10	58′ 5″	36′10″	10′	Pwh 2 J 6	855	1,800	200	525	42.0	StS
Bach Aircraft Co.	3-CT-9	271	39,500	CML	10	58′ 5″	36′10″	9′ 9″	Pww 2 J 6	875	1,800	200	525	42.0	StS
Bellanca Aircraft Corp.	Pacemaker	129	14,950	CML	6	46′ 4″	27′ 9″	8′ 4″	Wr J 6	300	2,000	112	850	.....	H, StS
Bellanca Aircraft Corp.	CH-300 Seaplane	129	18,000	CMZ	6	46′ 4″	30′	.....	Wr J 6	300	2,000	112	700	.....	H, StS
Bellanca Aircraft Corp.	Freighter	245	15,050	CML	4	46′ 4″	27′ 9″	8′ 4″	Wr J 6	300	2,000	112	850	.....	H, StS
Brunner-Winkle Aircraft Corp.	Bird, Model A	101	.....	OBL	3	34′	22′ 8″	8′	OX 5	90	1,400	45	600	7.0	W
Brunner-Winkle Aircraft Corp.	Bird, Model B	239	.....	OBL	3	34′	23′	8′	K	90	1,825	35	525	6.0	StS
Buhl Aircraft Co.	CA-8-A	98	19,500	CQL	8	48′	36′	10′	Cy	525	1,900	181	775	28.0	StS
Buhl Aircraft Co.	CA-8-B	99	19,500	CQL	8	48′	36′	10′	Pwh	525	1,900	181	775	28.0	StS
Buhl Aircraft Co.	CA-6	128	13,500	CQL	6	40′	29′ 8″	8′ 7″	Wr J 6	300	2,000	100	720	16.0	StS
Buhl Aircraft Co.	CA-3-D	163	12,000	CQL	3	36′	28′	8	Wr J 6	300	2,000	90	700	16.0	StS
Cessna Aircraft Co.	DC-6	207	9,200	CML	4	40′ 8″	27′11″	7′ 8″	Cu Ch	170	1,800	66	.....	10.0	StS
Cessna Aircraft Co.	DC-6-A	243	11,500	CML	4	40′ 8″	27′11″	7′ 8″	Wr J 6	300	2,000	66	.....	13.0	StS
Cessna Aircraft Co.	DC-6-B	244	10,000	CML	4	40′ 8″	27′11″	7′ 8″	Wr J 6	225	2,000	66	.....	11.0	StS
Command-Aire Inc.	3-C-3A	118	5,600	OBL	3	32′ 6″	24′ 6″	8′ 4″	War	110	1,850	45	800	5.5	W, H
Command-Aire Inc.	3-C-3B	120	3,350	OBL	3	31′ 6″	24′ 6″	8′ 4″	Y	110	1,720	.....	416	.....	W
Command-Aire Inc.	5-C-3 Ch	184	7,200	OBL	3	32′ 6″	24′ 6″	8′ 4″	Cu Ch	170	1,800	55	680	8.0	StS
Command-Aire Inc.	5-C-3 Ax	214	6,025	OBL	3	32′ 6″	24′ 6″	8′ 4″	Ax	150	1,800	55	730	7.5	H
Consolidated Aircraft Co.	Commodore	258	.....	CMF	24	100′	61′ 6″	.....	2 Pwh	1,150	1,900	600	1,050	60.0	Me
Courier Monoplane Co.	PB-1	285	.....	CML	3	37′	27′	.....	K	90	1,825	.....	.....	.....	.....
Crown Aircraft Corp.	Custombuilt B-3	199	4,975	OBL	2	28′	21′ 6″	8′ 6″	K	90	1,825	25	400	6.0	Sy, H
Cunningham-Hall Aircraft Corp.	PT-6	177	13,900	CBL	6	41′ 8″	29′ 8″	9′11″	Wr J 6	300	2,000	90	700	15.0	StS
Curtiss-Wright Corp															
Curtiss Aeroplane & Motor Co.	Carrier Pigeon	237	.....	OBL	1	47′ 6″	34′ 6″	.....	Cu Cq	600	2,400	.....	.....	.....	Cu Re
Curtiss Aeroplane & Motor Co.	Fledgling Ch.	191	.....	OBL	3	39′ 5″	.....	.....	Cu Ch	170	1,800	40	.....	.....	.....
Curtiss Aeroplane & Motor Co.	Fledgling K2	269	.....	OBL	3	39′ 5″	.....	.....	K	90	1,825	40	.....	.....	.....
Curtiss Aeroplane & Motor Co.	Condor	193	.....	CBL	21	91′ 8″	57′ 1″	16′ 6″	2 Cu Cq	1,200	2,400	278	.....	.....	Cu Re
Curtiss-Robertson Airpl. Mfg. Co.	Robin OX-5	68	4,000	CML	3	41′	25′ 9″	7′10″	OX 5	90	1,400	50	600	7.0	Hs
Curtiss-Robertson Airpl. Mfg. Co.	Robin R-600	143	7,500	CML	3	41′	25′ 1″	8′	Cu Ch	170	1,800	50	536	.....	Cu Re
Curtiss-Robertson Airpl. Mfg. Co.	Robin J	220	7,500	CML	3	41′	25′ 6″	8′	Wr J 6	165	2,000	50	536	.....	StS
Curtiss-Robertson Airpl. Mfg. Co.	Thrush J	261	.....	CML	6	48′	32′ 4″	9′ 3″	Wr J 6	225	2,000	110	.....	.....	Cu Re
Keystone-Loening Aircraft Corp.	Air Yacht	90, 91	.....	CBA	8	46′ 8″	34′ 9″	13′ 2″	Wr Cy, Pwh	525	1,900	140	525	28.0	StS
Keystone-Loening Aircraft Corp.	Commuter	219	16,800	CBA	4	40′	32′ 1″	13′ 6″	Wr J 6	300	2,000	70	400	15.0	StS
Keystone-Loening Aircraft Corp.	Patrician	260	.....	CML	20	86′ 6″	61′ 7″	13′ 4″	3 Cy, 3 Pwh	1,575	1,900	335	.....	.....	StS
Moth Aircraft Corp.	Gipsy Moth 60GM	197	4,500	OBL	2	30′	23′11″	8′ 9″	Wr Gy	90	2,100	23	360	5.5	W
Travel Air Mfg. Co.	A-6000-A	116	18,000	CML	6	54′ 5″	31′ 2″	9′ 1″	Pww	420	1,800	130	680	23.0	StS
Travel Air Mfg. Co.	6000-B	130	13,000	CML	6	48′ 6″	21′ 2″	9′ 3″	Wr J 6	300	2,000	82	500	13.0	StS
Travel Air Mfg. Co.	E-4000	188	.....	OBL	3	.....	.....	.....	Wr J 6	165	2,000	.....	.....	.....	.....
Travel Air Mfg. Co.	4-D	254	.....	OBL	3	33′	23′ 7″	.....	Wr J 6	165	2,000	.....	.....	.....	.....
Davis Aircraft Corp.	D-1	256	3,285	OML	2	30′ 6″	19′ 8″	7′	Lb	60	1,950	20	350	4.5	Hs
Davis Aircraft Corp.	D1-K	272	3,995	OML	2	30′ 6″	19′ 8″	7′	K	90	1,825	25	400	6.0	Hs
Detroit Aircraft Corp.															
Eastman Aircraft Corp.	Flying Yacht	288	9,595	OBF	4	36′	26′ 3″	8′	Cu Ch	170	1,800	48	407	10.6	StS
Lockheed Aircraft Co.	Air Express	102	.....	CML	5	43′	27′ 6″	9′ 6″	Pww	425	1,800	100	750	20.0	H
Lockheed Aircraft Co.	Vega Model 5B	227	18,900	CML	7	41′	27′ 6″	8′ 4″	Pww	425	1,800	67	515	.....	StS
Lockheed Aircraft Co.	Vega Model 2B	252	.....	CML	.....	.....	.....	.....	Wr J 6	300	2,000	.....	.....	.....	.....
Parks Air College, Inc.	P-1	179	3,165	OBL	3	29′ 8″	24′ 7″	9′ 4″	OX 5	90	1,400	35	305	10.0	Hs
Parks Air College, Inc.	P-11A	276	6,000	OBL	3	30′	23′ 6″	9′ 3″	Ax	115	1,800	52	435	12.0	StS
Ryan Aircraft Corp.	B-5	142	13,250	CML	6	42′ 4″	27′11″	9′10″	Wr J 6	300	2,000	100	800	15.0	StS
Ryan Aircraft Corp.	B-7	262	16,985	CML	6	42′ 4″	29′11″	9′ 9″	Pww	425	1,800	100	500	23.0	StS
Doyle Aero Corp.	O-2	247	2,995	OML	2	30′	19′	.....	Lb	60	1,950	25	425	5.0	Hs
Fairchild Aviation Corp.	42	242	12,900	CML	4	45′ 6″	30′ 6″	9′ 2″	Wr J 6	300	2,000	100	550	.....	H
Fairchild Aviation Corp.	71-A	289	18,900	CML	7	50′	32′11″	9′ 4″	Pww	420	1,800	148	650	.....	StS
Fairchild Aviation Corp.	KR-31	19	*2,240	OBL	3	30′	23′ 9″	9′ 4″	OX 5	90	1,400	33	.....	.....	.....
Fairchild Aviation Corp.	KR-34A	162	6,575	OBL	3	30′	23′ 5″	9′ 3″	Wr J 6	165	2,000	50	.....	.....	.....
Fairchild Aviation Corp.	KR-21	215	4,685	OBL	2	27′	21′ 1″	9′	K	90	1,825	23	.....	.....	.....

A —Amphibion	Cd —Cord	Fl —Flottorp	J6 —New Whirlwind	Ol —Oleo	Rv —Riveted	T —Tubing
Ad —Alclad	Cg —Corrugated	G —Glued	K —Kinner	Old —Oildraulic	S —Steel	Tr —Trombone
Aer —Aerol	Ch —Challenger	Ge —Genet	L —Landplane	Op —Optional	Sa —Sausedde	Trod—Treadle
Al —Axle	Cir —Cirrus	Go —Goodyear	La-1—Ace	OX-5 —Curtiss	Se —Sewed	Trs —Truss
Ans —Ansani	Co —Comet	Gr —Gruss	Lam—Lambert	P —Paragon	Se —Coil Springs	Ts —Tacked and sewn
Apl —Applied	Com—Compression	Gt —Gov't. test	Lb —LeBlond	Pe —Pedal	Sed —Screwed	W —Wood
Ar —Arena	Con—Continental	Gy —Gipsy	Li —Liberty	Pk —P-K screws	Sd —Stamped	Wa —Warren Truss
Aw —Air Wheels	Cq —Conquerer	H —Hamilton	Lk —Lockheed	Ply —Plywood	Sh —Sheet	War—Warner
Ax —Axelson	Cs —Shock Cord	He —Henderson	Lmd—Laminated	Pn —Pneumatic	Sk —Stick	We —Westinghouse
B —Biplane	Cu —Curtiss	His —Hispano	Lr —LeRhone	Pr —Push Rod	Sol —Solid	Wh —Wheel
Bak—Bakelite	Cv —Conventional	Ht —Heat treated	Ly —Lycoming	Pwh —P & W Hornet	Sp —Spruce	Wi —Wire
Be —Beam	Cy —Cyclone	Hw —Hess Warrior	M —Monoplane	Pwj —P & W Wasp Jr.	Spl —Split	Wl —Welded
Bo —Bolted	D —Duralumin	Hyd—Hydraulic	Me —Metal	Pww —P & W Wasp	Sr —Super Rhone	Wr —Wright
Box —Box spar	Dep—Deperdussin	Hs —Hartzell	Mo —Monocoque	Q —Sesquiplane	St —Standard	Wt —Wind Tunnel
Br —Brownback	Du —Dual	I —"I" section	Ms —Mfr's Statement	R —Rubber	Str —Straight	Y —Yankee
Bx —Bendix	Ex —Extra	In —Internal	N —New	Re —Reed	Su —Supreme	Z —Seaplane
C —Closed	F —Flying boat	Ir —Irwin	Na —Navigation	Ro —Routed	Sy —Story	* —Without engine
Ca —Cable	Fab —Fabric	J5 —Whirlwind	O —Open	Rus —Rusco	Sz —Szekely	

Specifications of American Commercial Airplanes

Including only planes with Approved Type Certificates—*AVIATION* does not assume responsibility for the figures given

Manufacturer	Designation	GENERAL							POWER PLANT						
		A.T.C. No.	Price at Factory	Type	No. of Seats	Span	Length Overall	Height Overall	Make Engine	Total Rated Hp.	R.p.m. at Rated Hp.	Fuel Cap. (Gal.)	Normal Range	Fuel Consumption at Cruising Speed Gal. per Hr.	Make of Prop.
Fleet Aircraft Inc.	Model I.	122	$5,485	OBL	2	28′	21′ 1″	8′ 9″	War	110	1,850	24	360	6.0	StS,Hs
Fleet Aircraft Inc.	Model II.	131	4,985	OBL	2	28′	20′ 9″	8′ 9″	K	90	1,825	24	360	6.0	StS,Hs
Fokker Aircraft Corp.	F-10A.	96	67,500	CML	12	79′ 3″	50′	12′ 8″	3 Pww	1,275	1,800	360	765	63.0	StS
Fokker Aircraft Corp.	Universal.	164	15,000	CML	4	47′ 9″	33′ 6″	8′	Wr J 6	300	2,000	75	525	.....	StS
Fokker Aircraft Corp.	F-11A.	222	42,000	CML	11	59′	45′10″	13′	Pwh Cy	525	1,800	120	425	21.0	StS
Fokker Aircraft Corp.	F-14.	234	26,500	CML	6	59′	43′ 4″	12′11″	Pwh	525	1,800	170	750	26.0	StS
Fokker Aircraft Corp.	F-32.	281	110,000	CML	32	99′	69′10″	16′ 6″	4 Pwh	2,100	1,800	400	.....	108	StS
Ford Motor Co.	4-AT-E.	132	.....	CML	11	74′	49′10″	11′ 9″	3 Wr J 6	900	2,000	231	550	.....	StS, H
Ford Motor Co.	5-AT-C.	165	.....	CML	15	77′10″	49′10″	12′	3 Pww	1,260	1,800	277	510	.....	StS, H
Ford Motor Co.	7-AT.	246	.....	CML	13	77′10″	49′10″	12′	2 Wr J 6,Pww	1,020	2,000	281	615	.....	StS, H
Ford Motor Co.	5-AT-C-S.	296	.....	CSM	13	77′10″	51′ 4″	14′ 6″	3 Pww	1,275	1,800	277	490	.....	.....
General Airplane Corp.	Aristocrat.	117	7,500	CML	3	36′ 4″	25′ 2″	7′ 7″	War	110	1,850	40	540	.....	StS
Great Lakes Aircraft Corp.	2T-1A.	228	5,150	OBL	2	26′ 8″	20′ 4″	8′ 5″	Cir	90	.....	26	390	6.0	Hz, P
Inland Aviation Co.	S-300.	259	.....	OML	2	30′	20′	7′ 7″	Lb	65	1,950	24	.....	.....	.....
Ireland Aircraft, Inc.	N-2-B.	153	18,000	CBA	4	40′	31′	12′ 2″	Wr J 6	300	2,000	80	450	15.0	StS
Ireland Aircraft, Inc.	N-2-C.	248	23,000	CBA	5	40′	31′	12′ 2″	Pww	425	1,800	80	450	18.0	StS
E. M. Laird Airplane Co.	LC-R-300.	176	11,500	OBL	3	28′	22′ 9″	9′	Wr J 6	300	2,000	76	550	.....	H
Lincoln Aircraft, Inc.	PT.	181	*1,985	OBL	2	32′ 3″	23′ 7″	8′10″	OX 5	90	1,400	30	300	8.0	H,Hs
Lincoln Aircraft, Inc.	PT K.	279	3,865	OBL	....	32′ 3″	25′ 7″	.....	K	90	1,825	.....	.....	.....	.....
Lincoln Aircraft, Inc.	PT W.	284	4,315	OBL	....	32′ 3″	25′ 3″	.....	War	110	1,850	.....	.....	.....	.....
Metal Aircraft Corp.	G-2-W.	192	21,000	CML	8	50′	32′ 6″	9′ 6″	Pww	425	1,800	140	700	22.0	StS
Mohawk Aircraft Corp.	Pinto.	263	.....	OML	2	34′11″	24′ 2″	7′ 7″	K	90	1,825	37	550	7.0	Hz,StS
Mohawk Aircraft Corp.	M-1-C.	297	.....	OML	2	34′11″	24′ 2″	7′ 7″	War	110	1,850	37	550	7.0	Hz,StS
Mono Aircraft Corp.	Monoprep.	218	2,835	CML	2	32′	21′	.....	Lam	55	2,000	.....	.....	.....	.....
Mono Aircraft Corp.	Monosport.	250	5,750	CML	2	32′ 2″	21′ 5″	.....	K	90	1,825	.....	.....	.....	.....
Mono Aircraft Corp.	Monoconch.	275	8,250	CML	4	39′	26′ 9″	.....	Wr J 6	225	2,000	.....	.....	.....	.....
New Standard Aircraft Corp.	D-29-A.	216	4,475	OBL	2	30′	24′ 9″	9′	K	90	1,825	22	.....	.....	StS,Sy
New Standard Aircraft Corp.	D-25-A.	224	9,750	OQL	5	45′	26′ 6″	10′ 2″	Wr J 6	225	2,000	62	.....	.....	StS
New Standard Aircraft Corp.	D-27-A.	226	.....	OQL	1	45′	26′ 6″	10′ 2″	Wr J 6	225	2,000	62	.....	.....	StS
Nicholas-Beazley Airplane Co., Inc.	Barling NB-3	174	3,600	OML	3	32′ 9″	21′11″	7′ 3″	Lb	60	1,950	18	380	4.7	W
Nicholas-Beazley Airplane Co., Inc.	Barling NB-3V.	230	3,600	OML	3	32′ 9″	22′ 3″	7′ 3″	Lam	55	2,000	18	380	4.7	W
Nicholas-Beazley Airplane Co., Inc.	Barling NB-3G.	231	3,900	OML	3	32′ 9″	22′ 5″	7′ 3″	Ge	80	.....	18	400	4.5	W
Paramount Aircraft Corp.	Cabinaire 165.	265	7,750	CBL	4	32′ 2″	24′ 7″	9′	Wr J 6	165	2,000	50	400	12.0	H
Pheasant Aircraft Co., Inc.	H-10.	36	2,895	OBL	3	32′ 6″	23′ 6″	9′	OX 5	90	1,400	38	400	9.0	Hs
Pitcairn Aircraft, Inc.	PA-7.	196	.....	OBL	3	33′	23′ 9″	9′ 6″	Wr J 6	225	2,000	63	.....	.....	StS
Simplex Aircraft Corp.	Red Arrow K-2-S.	43	4,500	OML	2	34′ 4″	22′ 3″	7′ 1″	K	90	1,825	40	600	6.5	W
Simplex Aircraft Corp.	Red Arrow W-2-S.	238	5,500	OML	2	34′ 4″	22′ 3″	7′ 1″	War	110	1,850	40	550	7.0	W
Spartan Aircraft Co.	C-3-165.	195	5,975	OBL	3	32′	23′10″	8′10″	Wr J 6	165	2,000	65	600	.....	StS, H
Spartan Aircraft Co.	C-3-225.	286	7,750	OBL	3	32′	23′ 3″	8′10″	Wr J 6	225	2,000	60	.....	.....	StS, H
Spartan Aircraft Co.	C-3-166.	290	5,675	OBL	3	32′	23′ 4″	8′10″	Co	165	1,900	65	550	.....	StS, H
Star Aircraft Co.	Cavalier C	255	2,985	.....	1	31′ 6″	19′ 8″	6′ 3″	Lb	60	1,950	25	500	5.0	.....
Stinson Aircraft Corp.	SM-6 B.	217	15,995	CML	6	52′ 8″	34′ 4″	9′ 8″	Pww	425	1,800	110	625	23.0	StS
Stinson Aircraft Corp.	SM-8 B.	294	8,495	CML	8	41′ 8″	29′ 4″	.....	Wr J 6	225	2,000	.....	.....	.....	.....
Stinson Aircraft Corp.	SM-8 A Jr.	295	5,775	CML	4	41′ 8″	28′11″	8′ 9″	Ly	210	2,000	.....	.....	.....	Me
Stinson Aircraft Corp.	SM-7 A.	298	10,495	CML	6	41′ 8″	31′	.....	Wr J 6	300	2,000	.....	.....	.....	.....
Swallow Airplane Co.	T-P.	105	2,878	OBL	2	30′11″	23′ 1″	8′ 7″	OX 5	90	1,400	28	600	7.0	W
Swallow Airplane Co.	F-28-Ax.	125	.....	OBL	3	32′	22′ 7″	8′ 7″	Ax	150	1,800	62	600	9.5	W
Swallow Airplane Co.	TP-K.	186	.....	OBL	2	30′11″	24′ 1″	8′ 7″	K	90	1,825	28	350	5.5	W
Swallow Airplane Co.	TP-W.	253	.....	OBL	2	30′11″	23′ 9″	8′ 7″	War	110	1,850	28	350	5.5	Me
Texas Aero Corp.	Temple.	45	.....	OML	....	39′ 4″	25′10″	8′ 3″	Wr J 5	200	2,000	50	.....	.....	.....
United Aircraft and Transport Corp.															
Boeing Airplane Co.	100.	133	20,000	OBL	1	30′	20′ 8″	9′ 7″	Pww	450	1,800	97	525	20.0	H
Boeing Airplane Co.	204.	157	.....	CBF	5	39′ 8″	32′ 6″	12′	Pww	450	1,900	80	350	20.0	Me
Boeing Airplane Co.	40-B-4.	183	.....	CBL	4	44′ 2″	33′ 4″	11′ 9″	Pwh	525	1,900	140	450	25.0	Me
Boeing Airplane Co.	80-A.	206	.....	CBL	18	80′	55′	15′ 2″	3 Pwh	1,575	1,900	400	500	90.0	Me
Hamilton Metalplane Co.	H-45.	85	.....	CML	8	54′ 5″	34′ 8″	9′ 4″	Pww	425	1,800	140	600	21.0	H
Hamilton Metalplane Co.	H-47.	94	.....	CML	8	54′ 5″	34′ 8″	9′ 4″	Pwh	525	1,800	140	600	23.0	H
Sikorsky Aviation Corp.	S-38.	126	.....	COA	12	71′ 8″	43′	13′10″	2 Pww	850	1,800	264	700	44.0	H
Stearman Aircraft Co.	M-2.	127	.....	OBL	1	46′	30′ 2″	11′ 1″	Wr Cy	525	1,900	136	860	.....	StS
Stearman Aircraft Co.	LT-1.	187	25,800	CBL	5	49′	32′ 6″	12′ 6″	Pwh	525	1,800	145	830	.....	StS
Stearman Aircraft Co.	C-3-R.	251	8,500	OBL	3	35′	23′11″	9′ 3″	Wr J 6	225	2,000	68	630	10.0	StS
Stearman Aircraft Co.	4 E.	272	.....	OBL	....	38′	26′ 4″	.....	Pww	425	1,800	.....	.....	.....	.....
Viking Flying Boat Co.	Kittyhawk B-2.	134	5,500	OBL	3	28′	22′ 6″	8′ 8″	Y.	105	1,720	35	500	6.5	Hs
Viking Flying Boat Co.	Kittyhawk B-4.	166	4,800	OBL	3	28′	22′11″	8′ 8″	K	90	1,825	35	500	6.5	Hs
Waco Aircraft Co.	90.	13	2,145	OBL	3	30′ 8″	23′ 6″	9′	OX 5	90	1,400	37	.....	8.0	Hs
Waco Aircraft Co.	165.	168	6,370	OBL	3	30′ 8″	23′	9′	Wr J 6	165	2,000	65	.....	10.0	H, Hs
Waco Aircraft Co.	225 str. w.	240	7,335	OBL	3	30′ 8″	22′ 6″	9′ 2″	Wr J 6	225	2,000	65	.....	12.0	H, Hs
Waco Aircraft Co.	225 tap. w.	257	8,525	OBL	3	30′ 3″	22′ 6″	9′	Wr J 6	225	2,000	87	.....	12.0	Me

Ace	—La-1	Challenger	—Ch	Fabric	—Fab	Irwin	—Ir	Open	—O	Seaplane	—Z	Treadle	—Tred
Aerol	—Aer	Cirrus	—Cir	Flottorp	—Fl	Kinner	—K	Optional	—Op	Sesquiplane	—Q	Trombone	—Tr
Air Wheels	—Aw	Closed	—C	Flying Boat	—F	Lambert	—Lam	Paragon	—P	Sewed	—Se	Truss	—Trs
Alclad	—Ad	Coil Springs	—Se	Genet	—Ge	Laminated	—Lmd	Pedal	—Pe	Sheet	—Sh	Tubing	—T
Amphibion	—A	Comet	—Co	Gipsy	—Gy	Landplane	—L	P-K Screws	—Pk	Shock Cord	—Cs	Walter	—Wa
Ansani	—Ans	Compression	—Com	Glued	—G	LeBlond	—Lb	Plywood	—Ply	Solid	—Sol	Warner	—War
Applied	—Apl	Conqueror	—Cq	Goodyear	—Go	LeRhone	—Lr	Pneumatic	—Pn	Split	—Spl	Welded	—Wl
Arena	—Ar	Continental	—Con	Gov't. Test	—Gt	Liberty	—Li	Push Rod	—Pr	Spruce	—Sp	Westinghouse	—We
Axelson	—Ax	Conventional	—Cv	Gruss	—Gr	Lockheed	—Lk	P & W Hornet	—Pwh	Stamped	—Sd	Wheel	—Wh
Axle	—Al	Cord	—Cd	Hamilton	—H	Lycoming	—Ly	P & W Wasp Jr.	—Pwj	Standard	—St	Whirlwind	—J5
Bakelite	—Bak	Corrugated	—Cg	Hartsell	—Hs	Metal	—Me	P & W Wasp	—Pww	Steel	—S	Whirlwind (New)	—J6
Beam	—Be	Curtiss	—Cu	Heat Treated	—Ht	Mfr's. Statement	—Ms	Reed	—Re	Stick	—Sk	Wire	—Wi
Bendix	—Bx	Curtiss	—OX-5	Henderson	—He	Monocoque	—Mo	Riveted	—Rv	Story	—Sy	Wind Tunnel	—Wt
Biplane	—B	Cyclone	—Cy	Hess Warrior	—Hw	Monoplane	—M	Routed	—Ro	Straight	—Str	Wood	—W
Bolted	—Bo	Duralumin	—D	Hispano	—His	Navigation	—Na	Rubber	—R	Super Rhone	—Sr	Wright	—Wr
Box Spar	—Box	Deperdussin	—Dep	Hydraulic	—Hyd	New	—N	Rusco Aero Rings	—Rus	Supreme	—Su	Yankee	—Y
Brownback	—Br	Dual	—Dual	"I" Section	—I	Oildraulic	—Old	Sausedde	—Sau	Szekely	—Sz	Without Engine	—*
Cable	—Ca	Extra	—Ex	Internal	—In	Oleo	—Ol	Screwed	—Scd	Tacked and Sewn	—Ts		

Specifications of American Commercial Airplanes

Including only planes with Approved Type Certificates—*AVIATION* does not assume responsibility for the figures given

Manufacturer	WEIGHTS					WINGS						FUSELAGE OR HULL							
						Spars		Ribs		Covering		Framework		Covering					
	Wing Loading (Lb. per Sq.Ft.)	Power Loading (Lb. per Hp.)	Weight Empty with Water if Water Cooled Engine is Used (Lb.)	Pay Load (Lb.)	Gross Weight (Lb.)	Material	How Fabricated—Section	Material	How Fabricated	Material	How Attached	Material	How Fabricated	Material	How Attached	Cockpit Dimensions	Cabin Dimensions	Minimum Headroom	Vol. Baggage Comp. (cu.ft.)
Alexander Eaglerock A-2	7.40	12.68	1,459	340	2,442	Sp	G	Sp	G, Bo	Fab	Ts	ST	Wl	Fab	Ts				
Alexander Eaglerock A-12	7.83	17.2	1,685	340	2,582	Sp	G	Sp	G, Bo	Fab	Ts	ST	Wl	Fab	Ts				
Alexander Eaglerock A-15	7.84	15.64	1,539	340	2,456	Sp	G	Sp	G, Bo	Fab	Ts	ST	Wl	Fab	Ts				
Alliance Argo	7.95	14.04	1,077	200	1,615	W	.....	W	G	Fab	Se	ST	Wl	.....	.....				
American Aeronautical S-56	7.5	21.5	1,447	342	2,150	Sp	G	Sp	G	Fab	Se	W	Sc, Bo	Ad	Se				
American Eagle Touroplane	12.88	18.18	1,320	425	2,100	Sp	Lmd	Sp	G	Fab	Se	ST	Wl	Fab	Se				
American Eagle Phaeton R-540	.....	....	1,770	405	2,623	Sp	Lmd	Sp	G	Fab	Se	ST	Wl	Fab	Se				
American Eagle 202	.....	.....	.....	.....	.....	Sp	Lmd	Sp	G	Fab	Se	ST	Wl	Fab	Se				
Arrow A2-60 L	7.35	19.5	900	170	1,346	W	G	W	G	Fab	Se	ST	Wl	Fab	Se	34x36"	.....	.....	3.0
Bach 3-CT-8	14.9	9.38	4,785	1,570	8,000	W	G, Box	Ply	G	Fab	Se	W	G, Bo	Ply	G	40x40"	46"x11'	5'	50.0
Bach 3-CT-9	14.9	8.9	5,010	1,525	8,000	W	G, Box	Ply	G	Fab	Se	W	G, Bo	Ply	G	40x40"	46"x11'	5'	50.0
Bellanca Pacemaker	15.74	14.32	2,363	1,042	4,300	Sp	Sol	Sp	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	12.0
Bellanca GH-300 Seaplane	17.6	16.1	2,863	1,042	4,800	Sp	Sol	Sp	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	12.0
Bellanca Freighter	16.82	15.33	2,290	1,415	4,600	Sp	Sol	Sp	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	46.0
Brunner-Winkle Bird Model A	8.1	24.0	1,300	400	2,150	W	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Brunner-Winkle Bird Model B	7.5	22.0	1,190	400	1,990	W	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Buhl CA-8-A	13.62	12.0	3,542	1,390	6,300	Sp	Box,S	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	13'4"x4'	4'7"	50.0
Buhl CA-8-B	13.62	12.0	3,542	1,390	6,300	Sp	Box,S	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	13'4"x4'	4'7"	50.0
Buhl CA-6	14.3	15.0	2,478	1,192	4,500	Sp	Box,S	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	11'4"x3'4"	4'	24.0
Buhl CA-3-D	13.3	10.66	2,017	413	3,200	Sp	Box,S	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	10'4"x3'2"	4'	14.0
Cessna DC-6	11.3	17.6	1,767	610	2,988	Sp	Box	Ply	G	Fab	Se	ST	Wl	Fab	Ts	38x40"	38"x42"	....	18.0
Cessna DC-6-A	11.87	10.61	1,932	610	3,180	Sp	Box	Ply	G	Fab	Se	ST	Wl	Fab	Ts	38x40"	38"x42"	....	18.0
Cessna DC-6-B	11.57	13.78	1,871	610	3,100	Sp	Box	Ply	G	Fab	Se	ST	Wl	Fab	Ts	38x40"	38"x42"	....	18.0
Command-Aire 3-C-3A	7.1	19.5	1,280	360	2,145	Sp	Sol	Sp	G	Fab	Se	ST	Wl	Fab	Se	30x33"	.....	.....	4
Command-Aire-3-C-3B	6.95	19.2	1,280	360	2,145	Sp	Sol	Sp	G	Fab	Se	ST	Wl	Fab	Se	30x33"	.....	.....	4
Command-Aire-5-C-3 Ch	6.92	13.9	1,448	510	2,363	Sp	Sol	Sp	G	Fab	Se	ST	Wl	Fab	Se	30x33"	.....	.....	4
Command-Aire-5-C-3 AX	6.28	15.8	1,458	510	2,373	Sp	Sol	Sp	G	Fab	Se	ST	Wl	Fab	Se	30x33"	.....	.....	4
Consolidated Commodore	15.8	15.3	9,785	5,270	17,600	D	Rv	D	Rv	Fab	Se	D	Rv Bo	D	Rv	.....	8'5"x18'4"	6'	200
Courier-P-B-1	9.5	20.0	1,350	....	2,100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crown Custombuilt B 3	7.62	17.56	1,242	....	1,756	Sp	I	Sp,Ply	Cv	Fab	Se	Ply	Wa	Fab, Ply	Mo	24x30"	.....	.....	.....
Cunningham-Hall PT-6	11.7	13.5	2,670	920	4,350	S	Bo	D	Rv	Fab	Se	ST	Wl	Fab, D	Se, Rv	45x48"	42"x75"	60"	27
Curtiss-Wright Corp.																			
Curtiss Carrier Pigeon	13.82	11.96	4,235	....	7,600	ST	Wl	D	.....	.....	.....	.....	.....	Mo Me	Rv	.....	.....	.....	.....
Curtiss Fledgling Ch	.....	....	.....	.....	.....	Sp	Lmd	Ply	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Curtiss Fledgling K 2	.....	.....	.....	.....	.....	Sp	Lmd	Ply	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Curtiss Condor	11.5	14.47	11,352	3,600	17,378	D	Rv	D	Rv	Fab	Se	D	Rv	Ply	Bo	.....	.....	.....	.....
Curtiss Robin OX-5	8.94	24.14	1,489	328	2,271	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Curtiss Robin R 600	10.7	15.29	1,700	454	2,600	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Curtiss Robin-J	10.4	14.8	1,615	390	2,513	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Curtiss Thrush-J	12.4	17.0	2,260	....	3,800	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Keystone Air Yacht	11.4	11.25	3,895	1,150	6,250	Sp	Sol	D	.....	Fab	Se	W	Wl	D	Rv	.....	10'x4'	.....	.....
Keystone Commuter	9.45	13.7	2,850	640	4,130	Sp	.....	D	Bo	Fab	Se	D	Bo	.....	.....	.....	6'4"x4'	.....	.....
Keystone Patrician	16.3	9.84	10,200	3,662	16,600	.....	.....	.....	.....	Fab	Se	ST	.....	.....	.....	.....	20'x6'6"	.....	.....
Gipsy Moth 60 G-M	6.78	16.5	990	345	1,650	Sp	Sol, Ro	Ply	G	Fab	Se	ST	Wl	Fab	Se	19x21"	.....	.....	2
Travel Air A-6000-A	15.4	12.5	3,250	985	5,250	Sp	Box	S, Sp	Trs	Fab	....	ST	Wl	Fab	.....	.....	113"x53"	.....	.....
Travel Air 6000-B	15.1	14.1	2,500	975	4,230	Sp	Box	Sp	Trs	Fab	....	ST	Wl	Fab	.....	.....	113"x53"	.....	.....
Travel Air E-4000	9.3	16.4	.....	.....	2,700	Sp	Ro	Sp	.....	Fab	....	ST	Wl	Fab	.....	.....	.....	.....	.....
Travel Air 4-D	10.0	12.9	1,837	....	2,900	Sp	Ro	Sp	.....	Fab	....	ST	Wl	Fab	.....	.....	.....	.....	.....
Davis D-1	10.0	13.3	816	350	1,300	Sp	Lmd	D	Sd	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Davis D-1-K	10.0	13.3	920	385	1,400	Sp	Lmd	D	Sd	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Detroit Aircraft Corp.																			
Eastman Flying Yacht	11.65	16.0	1,745	575	2,725	Sp	Box	Sp	Wa	Fab	Se	W	.....	D	Bo	.....	.....	.....	.....
Lockheed Air Express	15.20	10.42	2,533	1,012	4,375	Sp	Box	Sp	G	Ply	....	.....	.....	Mo Ply	G	.....	.....	.....	.....
Lockheed Vega Model 5 B	15.51	10.17	2,490	1,140	4,265	Sp	Box	Sp	G	Ply	....	.....	.....	Mo Ply	G	.....	.....	.....	.....
Lockheed Vega Model 2 B	15.51	10.17	2,490	1,140	4,261	Sp	Box	Sp	G	Ply	....	.....	.....	Mo Ply	G	.....	.....	.....	.....
Parks P-1	7.41	23.08	1,311	375	2,078	Sp	Ro	Sp,Ply	G	Fab	Ts	ST	Wl	Fab	Ts	31x33"	.....	.....	1.3
Parks P-11 A	8.52	14.73	1,483	....	2,380	Sp	Ro	Sp,Ply	G	Fab	Ts	ST	Wl	Fab	Ts	31x33"	.....	.....	2.5
Ryan B-5	14.3	13.3	2,250	920	4,000	W	G	W	G	Fab	Se	ST	Wl	Fab	.....	.....	114"x47"	47"	2
Ryan B-7	15.3	10.2	2,500	950	4,283	W	G	W	G	Fab	Se	ST	Wl	Fab	Se	.....	114"x47"	47"	20
Doyle O-2	8.0	20.3	790	....	1,320	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fairchild 42	14.8	14.33	2,720	....	4,300	.....	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Fairchild 71-A	16.56	13.75	3,130	....	5,500	.....	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Fairchild KR-31	7.0	23.0	1,200	....	2,078	.....	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Fairchild KR-34 A	8.4	14.5	1,492	....	2,342	.....	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Fairchild KR-21	8.02	17.02	1,015	....	1,550	.....	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....

A —Amphibion
Ad —Alclad
Aer —Aerol
Al —Axle
Anz —Anzani
Apl —Applied
Ar —Arena
Aw —Air Wheels
Ax —Axelson
B —Biplane
Bak —Bakelite
Be —Beam
Bo —Bolted
Box —Box spar
Br —Brownback
Bx —Bendix
C —Closed
Ca —Cable
Cd —Cord
Cg —Corrugated
Ch —Challenger
Cir —Cirrus
Co —Comet
Com—Compression
Con—Continental
Cq —Conquerer
Cs —Shock Cord
Cu —Curtiss
Cv —Conventional
Cy —Cyclone
D —Duralumin
Dep—Deperdussin
Du —Dual
Ex —Extra
F —Flying boat
Fab —Fabric
Fl —Flottorp
G —Glued
Ge —Genet
Go —Goodyear
Gr —Gruss
Gt —Gov't. test
Gy —Gipsy
H —Hamilton
He —Henderson
His —Hispano
Ht —Heat treated
Hw —Hess Warrior
Hyd—Hydraulic
Hz —Hartzell
I —"I" section
In —Internal
Ir —Irwin
J5 —Whirlwind
J6 —New Whirlwind
K —Kinner
L —Landplane
La-I—Ace
Lam—Lambert
Lb —LeBlond
Li —Liberty
Lk —Lockheed
Lmd—Laminated
Lr —LeRhone
Ly —Lycoming
M —Monoplane
Me —Metal
Mo —Monocoque
Ms —Mfr's Statement
N —New
Na —Navigation
O —Open
Ol —Oleo
Old —Oildraulic
Op —Optional
OX-5 —Curtiss
P —Paragon
Pe —Pedal
Pk —P-K screws
Ply —Plywood
Pn —Pneumatic
Pr —Push Rod
Pwh —P & W Hornet
Pwj —P & W Wasp Jr.
Pww —P & W Wasp
Q —Sesquiplane
R —Rubber
Re —Reed
Ro —Routed
Rus —Rusco
Rv —Riveted
S —Steel
Sa —Sausedde
Se —Sewed
Sc —Coil Springs
Scd —Screwed
Sd —Stamped
Sh —Sheet
Sk —Stick
Sol —Solid
Sp —Spruce
Spl —Split
Sr —Super Rhone
St —Standard
Str —Straight
Su —Supreme
Sy —Story
Sz —Szekely
T —Tubing
Tr —Trombone
Tred—Treadle
Trs —Truss
Ts —Tacked and sewn
W —Wood
Wa —Warren Truss
War—Warner
We —Westinghouse
Wh —Wheel
Wi —Wire
Wl —Welded
Wr —Wright
Wt —Wind Tunnel
Y —Yankee
Z —Seaplane
* —Without engine

Specifications of American Commercial Airplanes

Including only planes with Approved Type Certificates—*AVIATION* does not assume responsibility for the figures given

Manufacturer	WEIGHTS					WINGS						FUSELAGE OR HULL							
						Spars		Ribs		Covering		Frame-work		Covering					
	Wing Loading (Lb. per Sq. Ft.)	Power Loading (Lb. per Hp.)	Weight Empty with Water if Water Cooled Engine is Used (Lb.)	Pay Load (Lb.)	Gros Weight (Lb.)	Material	How Fabricated—Section	Material	How Fabricated	Material	How Attached	Material	How Fabricated	Material	How Attached	Cockpit Dimensions	Cabin Dimensions	Minimum Headroom	Vol. Baggage Comp.
Fleet Model I	8.1	17.5	1,022	224	1,580	Sp	Sol	D	Rv	Fab	Pk	ST	Wl	Fab	Se	.....	.....	.....	.....
Fleet Model II	8.08	14.32	1,010	231	1,575	Sp	Sol	D	Rv	Fab	Pk	ST	Wl	Fab	Se	.....	.....	.....	.....
Fokker F 10 A	15.4	10.28	7,780	2,520	13,000	W	Box	Sp,Ply	G	Ply	G	ST	Wl	Fab	Se	.....	190"x60"	.....	65.3
Fokker Universal	13.05	14.35	2,432	1,188	4,300	W	Box	Sp,Ply	G	Ply	G	ST	Wl	Fab	Se	.....	93"x41"	.....	.....
Fokker F-11 A	13.8	13.15	4,470	1,295	6,900	W	Box	Sp,Ply	G	Ply	G	D	Rv	D	Rv	.....	132"x54"	.....	46.8
Fokker F-14	12.75	13.35	4,038	1,600	7,000	W	Box	Sp,Ply	G	Ply	G	ST	Wl	Fab	Se	.....	114"x44"	.....	5.3
Fokker F-32	13.05	10.73	14,200	.....	22,500	W	Box	Sp,Ply	G	Ply	G	ST	Wl	Fab	Se	.....	.....	.....	52.7
Ford 4-AT-E	15.46	12.6	6,500	1,725	10,130	D	Rv	D	Sd	D	Rv	Me	Rv	D	Rv	.....	4'6"x16'3"	5'6"	30
Ford 5-AT-C	16.16	10.7	7,500	3,743	13,500	D	Rv	D	Sd	D	Rv	Me	Rv	D	Rv	.....	4'6"x18'9"	5'6"	30
Ford 7-AT	15.46	12.6	7,280	3,380	12,910	D	Rv	D	Sd	D	Rv	Me	Rv	D	Rv	.....	4'6"x18'x"	5'6"	30
Ford 5-AT-C-S	16.2	10.7	8,900	2,343	13,500	D	Rv	D	Sd	D	Rv	Me	Rv	D	Rv	.....	4'6"x18'9"	5'6"	30
General Aristocrat	10.84	19.08	1,248	365	2,100	Sp	.....	Sp	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Great Lakes ZT-1A	8.43	17.58	1,002	197	1,580	Sp	RoI	D Sh	Sd	Fab	Se	ST	Wl	Fab	Se	28"	.....	.....	.....
Inland S-300	8.97	19.9	765	195	1,292	Sp	Ro	W	.....	Fab	Ta	ST	Wl	Fab	Se	.....	.....	.....	.....
Ireland N-2-B	14.4	10.4	2,900	600	4,300	Sp	Ro	D	Sd	Fab	Se	ST	Wl	D	Rv	.....	60"x40"	4'	.....
Ireland N-2-C	13.0	11.5	3,240	900	4,900	Sp	Ro	D	Sd	Fab	Se	ST	Wl	D	Rv	.....	60"x40"	4'	.....
Laird LC-R-300	15.3	10.6	1,922	.....	3,010	W	.....	W	G	Fab	Se	DT	.....	Fab	Se	.....	.....	.....	.....
Lincoln PT	6.6	21.1	1,290	395	1,800	Sp	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	24x42"	.....	.....	.....
Lincoln PT-K	6.0	20.0	1,176	.....	1,767	Sp	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	24x42"	.....	.....	.....
Lincoln PT-W	6.0	16.4	1,203	.....	1,794	Sp	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	24x42"	.....	.....	.....
Metal G-2-W	15.8	13.81	3,360	1,340	5,800	D	Rv	D	Rv	D	Rv	ST	Wl	D	Rv	.....	.....	.....	.....
Mohawk Pinto	11.72	18.9	1,125	675	1,800	W	.....	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Mohawk M-I-C	11.72	18.9	1,125	675	1,800	W	.....	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Mono Monoprep	9.0	23.41	783	.....	1,288	W	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Mono Monosport	12.5	15.0	1,025	407	1,650	W	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Mono Monocoach	13.93	13.73	1,919	750	3,092	W	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
New Standard D-29-A	6.6	17.9	1,075	210	1,610	Sp	.....	Ply	G	Fab	Se	D	Rv Bo	Fab	.....	.....	.....	.....	.....
New Standard D-25-A	9.6	14.85	2,055	710	3,345	Sp	Lmd	Ply	G	Fab	Se	D	Rv Bo	Fab	.....	.....	.....	.....	3
New Standard D-27-A	9.7	15.1	2,055	765	3,400	Sp	Lmd	Ply	G	Fab	Se	D	Rv Bo	Fab	Se	.....	.....	.....	62
Nicholas-Beazley Barling NB-3	8.6	21.12	744	340	1,373	D	Rv	D	Rv	Fab	Se	D	Wl	Fab	Se	.....	.....	.....	.....
Nicholas-Beazley Barling NB-3V	8.78	25.47	772	340	1,401	D	Rv	D	Rv	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Nicholas-Beazley Barling NB-3G	8.55	17.05	735	340	1,364	D	Rv	D	Rv	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Paramount Cabinaire 165	8.5	15.94	1,620	510	2,630	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Pheasant H-10	8.0	17.25	1,297	600	2,082	Sp	G	Sp	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	5
Pitcairn PA-7	12.5	13.55	1,820	.....	3,050	Sp	.....	S	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	40
Simplex Red Arrow K-2-S	11.1	19.6	1,100	243	1,785	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Simplex Red Arrow W-2-S	11.1	16.2	1,100	243	1,785	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Spartan C-3-165	9.0	15.85	1,650	370	2,618	Sp	I	Sp	G	Fab	Ta	ST	Wl	Fab	Se	.....	.....	.....	.....
Spartan C-3-225	9.29	12.0	1,740	380	2,700	Sp	I	Sp	G	Fab	Ta	ST	Wl	Fab	Se	.....	.....	.....	.....
Spartan C-3-166	8.61	15.18	1,637	370	2,605	Sp	I	Sp	G	Fab	Ta	ST	Wl	Fab	Se	.....	.....	.....	.....
Star Cavalier C	9.0	21.5	855	.....	.....	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Stinson SM-6B	15.8	13.4	3,396	1,072	5,350	Sp	Ro	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	14'x4'	4'7"	51
Stinson SM-8 B	13.7	14.2	2,063	.....	3,200	Sp	Ro	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	10'x3'3"	4'1"	20
Stinson SM-8 A Jr	13.7	15.6	2,061	.....	3,195	Sp	Ro	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	9'x3'3"	4'1"	20
Stinson SM-7 A	14.9	11.7	2,234	.....	3,500	Sp	Ro	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	10'x3'3"	4'1"	20
Swallow TP	6.6	20.25	1,270	180	1,875	W	.....	W	G	Fab	Se	ST	Wl.	Fab	Se	.....	.....	.....	.....
Swallow F-28-Ax	8.3	16.5	1,574	400	2,497	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Swallow TP-K	5.75	19.0	1,170	170	1,700	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Swallow TP-W	5.8	15.5	1,201	170	1,739	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Texas Temple	10.0	11.25	1,350	567	2,250	W	.....	W	G	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
United Aircraft & Transport Corp.																			
Boeing 100	11.8	5.97	1,882	60	2,750	Sp	Box	Sp	Web	Fab	Se	S, D	Wl,Rv	D, Fab	Bo,Se	34x45"	.....	.....	4
Boeing 204	10.62	12.2	3,358	913	5,000	Sp	Ro	Sp	Web	Fab	Se	Ply	G, Bo	.....	.....	.....	52"x9'3"	50"	15
Boeing 40-B-4	11.15	11.57	3,809	1,171	6,080	Sp	Ro	Sp	Web	Fab	Se	ST	Wl	D, Fab	Bo,Se	32x42"	38"x48"	43"	25
Boeing 80-A	14.0	11.6	10,417	4,057	17,500	D	Bo, Rv	D	Bo, Rv	Fab	Se	ST	Wl	Fab	Se	64x50"	63"x19'6"	7'	.....
Hamilton H-45	14.33	14.35	3,300	1,153	5,750	D	Rv	D	Rv	D	Rv	D	Rv	D	Rv	.....	.....	.....	.....
Hamilton H-47	14.85	11.0	3,450	1,045	5,750	D	Rv	D	Rv	D	Rv	D	Rv	D	Rv	.....	.....	.....	.....
Sikorsky S-38	14.3	12.3	6,500	1,900	10,480	D	Rv	D	Rv	Fab	....	W	Bo	Ad	Scd	.....	.....	.....	.....
Stearman M-2	12.79	10.62	3,442	1,000	5,578	Sp	.....	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Stearman LT-1	12.76	11.90	3,890	1,215	6,250	Sp	.....	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Stearman C-3-R	9.38	12.0	1,741	400	2,700	Sp	.....	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Stearman 4-E	12.82	9.37	2,434	.....	3,936	Sp	.....	Sp	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Viking Kittyhawk B-2	8.15	18.1	1,139	357	1,899	W	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Viking Kittyhawk B-4	8.05	18.8	1,107	362	1,875	W	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Waco 90	7.03	22.5	1,199	.....	2,025	.....	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Waco 165	9.03	15.75	1,529	.....	1,575	W	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Waco 225 str. w	9.03	13.00	1,550	.....	2,600	W	.....	W	.....	Fab	Se	ST	Wl	Fab	Se	.....	.....	.....	.....
Waco 225 tap. w	11.45	13.00	1,787	.....	2,600	W	.....	W	.....	Fab	Se	S	.....	Fab	.....	.....	.....	.....	.....

Ace	—La-1	Challenger	—Ch	Fabric	—Fab	Irwin	—Ir	Open	—O	Seaplane	—Z	Treadle	—Tred
Aerol	—Aer	Cirrus	—Cir	Flottorp	—Fl	Kinner	—K	Optional	—Op	Sesquiplane	—Q	Trombone	—Tr
Air Wheels	—Aw	Closed	—C	Flying Boat	—F	Lambert	—Lam	Paragon	—P	Sewed	—Se	Truss	—Trs
Alclad	—Ad	Coil Springs	—Sc	Genet	—Ge	Laminated	—Lmd	Pedal	—Pe	Sheet	—Sh	Tubing	—T
Amphibion	—A	Comet	—Co	Gipsy	—Gy	Landplane	—L	P-K Screws	—Pk	Shock Cord	—Cs	Walter	—Wa
Ansani	—Ans	Compression	—Com	Glued	—G	LeBlond	—Lb	Plywood	—Ply	Solid	—Sol	Warner	—War
Applied	—Apl	Conqueror	—Cq	Goodyear	—Go	LeRhone	—Lr	Pneumatic	—Pn	Split	—Spl	Welded	—Wl
Arena	—Ar	Continental	—Con	Gov't. Test	—Gt	Liberty	—Li	Push Rod	—Pr	Spruce	—Sp	Westinghouse	—We
Axelson	—Ax	Conventional	—Cv	Gruss	—Gr	Lockheed	—Lk	P & W Hornet	—Pwh	Stamped	—Sd	Wheel	—Wh
Axle	—Al	Cord	—Cd	Hamilton	—H	Lycoming	—Ly	P & W Wasp Jr.	—Pwj	Standard	—St	Whirlwind	—J5
Bakelite	—Bak	Corrugated	—Cg	Hartsell	—Hs	Metal	—Me	P & W Wasp	—Pww	Steel	—S	Whirlwind (New)	—J6
Beam	—Be	Curtiss	—Cu	Heat Treated	—Ht	Mfr's. Statement	—Ms	Reed	—Re	Stick	—Sk	Wire	—Wi
Bendix	—Bx	Curtiss	—OX-5	Henderson	—He	Monocoque	—Mo	Riveted	—Rv	Story	—Sy	Wind Tunnel	—Wt
Biplane	—B	Cyclone	—Cy	Hess Warrior	—Hw	Monoplane	—M	Routed	—Ro	Straight	—Str	Wood	—W
Bolted	—Bo	Duralumin	—D	Hispano	—His	Navigation	—Na	Rubber	—R	Super Rhone	—Sr	Wright	—Wr
Box Spar	—Box	Deperdussin	—Dep	Hydraulic	—Hyd	New	—N	Rusco Aero Rings	—Rus	Supreme	—Su	Yankee	—Y
Brownback	—Br	Dual	—Dual	"I" Section	—I	Oildraulic	—Old	Sausedde	—Sau	Szekely	—Sz	Without Engine	—*
Cable	—Ca	Extra	—Ex	Internal	—In	Oleo	—Ol	Screwed	—Scd	Tacked and Sewn	—Ts		

Specifications of American Commercial Airplanes

Including only planes with Approved Type Certificates—*AVIATION* does not assume responsibility for the figures given

Manufacturer	LANDING GEAR							AREA (sq. ft.)							PERFORMANCE					
	Material	Type	Tread	Wheels Type and Size	Brakes	Shock Unit L. S. and Tail	Tail Wheel	Wing	Aileron	Fin	Rudder	Stabilizer	Elevator	High Speed (M.P.H.)	Cruising Speed (M.P.H.)	R.P.M. at Cruising	Stall Speed (M.P.H.)	Climb at Sea Level F.P.M.	Service Ceiling (Ft.)	Performance Basis
Alexander Eaglerock A-2	S	Spl Al	6′	26x 4	Ex	Cs	No	330	42.56	4.25	10.18	23.76	16.76	100	87	1,400	40	514	11,500	Gt
Alexander Eaglerock A-12	S	Spl Al	6′	30x 5	Ex	Cs	No	330	42.56	4.25	10.18	23.76	16.76	116	105	1,750	45	720	12,820	Gt
Alexander Eaglerock A-15	S	Spl Al	6′	30x 5	Ex	Cs	No	330	42.56	4.25	10.18	23.76	16.76	100	85	1,700	40	480	9,400	Gt
Alliance Argo	S	.....	.....	.....	.....	.....	.....	203	.....	.....	.....	.....	.....	125	100	.....	.....	1,050	16,000	Ms
American Aeronautical S-56	ST, D	.....	64″	Wi 20x 4	No	R	No	286	24.2	8.3	7.9	17.0	15.5	86	75	1,670	40	400	5,000	Ms
American Eagle Touroplane	ST	Spl Al	.....	.....	Yes	Ol	No	212	.....	.....	.....	.....	.....	115	100	.....	.....	800	18,000	Ms
American Eagle Phaeton, R-540	ST	Spl Al	.....	.....	Yes	Ol	No]	233	29.34	6.42	9.02	19.76	18.04	136	111	1,800	57	.....	.....	Ms
American Eagle 202	ST	Spl Al	.....	.....	Yes	Ol	No	253	31.2	3.65	6.93	18.67	15.96	130	112	1,750	30	.....	.....	Ms
Arrow A2-60L	ST	Spl Al	6′6″	Wi 26x 4	No	Cs	No	183	8.75	2.9	5.8	13.0	10.4	100	85	1,800	30	900	14,000	Ms
Bach 3-CT-8	S	Spl Al	18′	Bx 36x 8	Bx	Ol, Cs	Ol R	538	32.32	5.4	11.65	38.6	23.0	157	133	.....	60	1,180	18,500	Ms
Bach 3-CT-9	S	Spl Al	18′	Bx 36x 8	Bx	Ol, Cs	Ol R	538	32.32	5.4	11.65	38.6	23.0	162	136	1,650	60	1,380	20,000	Ms
Bellanca Pacemaker	ST	Spl Al	.....	Bx 32x 6	Bx	Ol	Pn	273	.....	.....	.....	.....	.....	145	122	1,750	48	1,000	18,000	Ms
Bellanca CH-300 Seaplane	.....	.....	.....	.....	.....	.....	.....	273	.....	.....	.....	.....	.....	136	110	1,750	.....	650	16,000	Ms
Bellanca Freighter	ST	Spl Al	.....	Bx 32x 6	Bx	Ol	Pn	273	.....	.....	.....	.....	.....	145	122	1,750	48	900	17,000	Ms
Brunner-Winkle Bird Model A	ST	.....	.....	.....	No	.....	.....	266	.....	.....	.....	.....	.....	110	90	.....	.....	700	15,000	Ms
Brunner-Winkle Bird Model B	ST	.....	.....	.....	No	.....	.....	266	.....	.....	.....	.....	.....	110	90	.....	.....	800	16,000	Ms
Buhl CA-8-A	S	Spl Al	.....	Bx 36x 8	Bx	Ol	Yes	462	30.0	5.75	12.65	24.3	24.7	145	120	1,700	45	1,000	18,000	Ms
Buhl CA-8-B	S	Spl Al	.....	Bx 36x 8	Bx	Ol	Yes	462	30.0	5.75	12.65	24.3	24.7	145	120	1,700	45	1,000	18,000	Ms
Buhl CA-6	S	Spl Al	.....	Bx 32x 6	Bx	Ol	Yes	315	27.54	4.97	8.7	18.04	18.68	140	115	1,750	45	900	15,000	Ms
Buhl CA-3-D	S	Spl Al	.....	Bx 30x 5	Bx	Ol	Yes	240	16.0	4.7	8.08	13.56	17.96	150	125	1,750	45	900	15,000	Ms
Cessna DC-6	ST	Spl Al	8′ 6″	Bx 30x 5	Bx	Old	Yes	268	.....	.....	.....	.....	.....	130	105	.....	.....	600	15,000	Ms
Cessna DC-6-A	ST	Spl Al	8′ 6″	Bx 30x 5	Bx	Old	Yes	265	17.8	5.3	9.3	22.2	16.2	161	130	1,700	54	1,200	19,000	Ms
Cessna DC-6-B	ST	Spl Al	8′ 6″	Bx 30x 5	Bx	Old	Yes	265	17.8	5.3	9.3	22.2	16.2	148	115	1,700	52	900	17,000	Ms
Command-Aire 3-C-3A	ST	Spl Al	80″	Aw22x10	Go	.....	No	303	19.0	2.8	7.2	19.0	16.4	98	85	1,750	38	500	10,000	Ms
Command-Aire 3-C-3B	ST	Spl Al	80″	Aw22x10	Go	.....	No	303	19.0	2.8	7.2	19.0	16.4	98	85	1,600	38	.....	.....	Ms
Command-Aire 5-C-3Ch	ST	Spl Al	84″	Bx 30x 5	Bx	Cs	No	287	19.0	2.8	7.2	19.0	16.4	120	98	1,800	45	.....	.....	Ms
Command-Aire 5-C-3AX	ST	Spl Al	84″	Bx 30x 5	Bx	Cs	No	287	19.0	2.8	7.2	19.0	16.4	115	96	1,750	45	800	16,000	Ms
Consolidated Commodore	.....	.....	.....	.....	.....	.....	.....	1,110	10.0	.....	40.2	81.0	54.5	.....	.....	.....	.....	.....	.....	.....
Courier P-B-1	ST	Spl Al	.....	.....	.....	.....	No	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crown Custombuilt B3	ST	Spl Al	84″	Wi 24x 4	No	Gr	No	236	22.0	3.7	5.65	13.6	10.24	112	98	1,600	35	750	13,000	Gt
Cunningham-Hall PT-6	S	Spl Al	94″	Bx 32x 6	Bx	Aer	.....	370	31.0	7.5	13.0	29.5	22.5	133	110	.....	50	1,050	17,500	Ms
Curtiss-Wright Corp.																				
Curtiss Carrier Pigeon	ST	Spl Al	.....	.....	Yes	Ol	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Curtiss Fledgling Ch	ST	Spl Al	.....	.....	.....	Ol	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Curtiss Fledgling K2	ST	Spl Al	.....	.....	.....	Ol	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Curtiss Condor	ST	Tred	.....	.....	Yes	Ol	Yes	1,512	241.4	.....	53.0	.....	47.6	.....	116	.....	.....	870	17,000	Ms
Curtiss Robin OX-5	ST	Spl Al	.....	.....	No	.....	.....	243	.....	.....	.....	.....	.....	101	85	.....	.....	400	11,250	Ms
Curtiss Robin R-600	ST	Spl Al	.....	.....	Bx	Ol	.....	234	.....	.....	.....	.....	.....	120	101	.....	.....	640	12,700	Ms
Curtiss Robin-J	ST	Spl Al	.....	.....	Bx	Ol	.....	243	.....	.....	.....	.....	.....	120	101	.....	.....	640	12,700	Ms
Curtiss Thrush-J	ST	Spl Al	.....	.....	Bx	Ol	.....	305	.....	.....	.....	.....	.....	120	102	.....	.....	650	13,200	Ms
Keystone Air Yacht	.....	.....	.....	36x 8	.....	Hyd	.....	517	.....	.....	.....	.....	.....	130	105	.....	.....	850	13,800	Ms
Keystone Commuter	.....	.....	.....	30x 5	.....	Aer	.....	437	.....	.....	.....	.....	.....	112	87	.....	.....	850	12,000	Ms
Keystone Patrician	ST	.....	.....	44x10	Bx	Alco	.....	930	.....	.....	.....	.....	.....	144	120	.....	.....	1,080	14,500	.....
Gipsy Moth 60-GM	ST	Spl Al	5′ 3″	Wi 16x 4	No	R	No	243	22.2	2.78	9.45	13.34	12.9	103	85	1,900	45	700	18,000	Gt
Travel Air A-6000-A	Ht S	Spl Al	108″	Bx 32x 6	Bx	Ol	Yes	340	33.5	6.3	13.5	35.1	21.2	145	118	1,700	67	1,000	18,000	Ms
Travel Air 6000-B	Ht S	Spl Al	108″	Bx 32x 6	Bx	Ol	Yes	280	30.4	6.3	13.5	35.1	21.2	133	112	1,700	65.8	800	16,000	Ms
Travel Air E-4000	Ht S	Spl Al	78″	Bx 30x 5	Bx	Cs	No	289	19.5	4.5	9.2	16.8	16.8	122	103	1,700	54.7	.....	.....	Ms
Travel Air 4-D	Ht S	Spl Al	84″	Bx 30x 5	Bx	Ol	No	289	19.5	4.5	9.2	21.7	17.1	130	106	1,700	56.7	.....	.....	Ms
Davis D-1	ST	Spl Al	6′ 6″	Wi 18x 4	No	Cs	No	145	.....	.....	.....	.....	.....	131	105	1,700	45	700	10,000	Ms
Davis D1-K	ST	Spl Al	6′ 6″	Wi 18x 4	No	Cs	No	145	.....	.....	.....	.....	.....	131	105	1,700	45	1,200	12,000	Ms
Detroit Aircraft Corp.																				
Eastman Flying Yacht	.....	.....	.....	.....	.....	.....	.....	244	.....	.....	.....	.....	.....	112	90	.....	.....	1,000	14,000	Ms
Lockheed Air Express	ST	Spl Al	.....	.....	.....	.....	.....	288	.....	.....	.....	.....	.....	165	135	.....	.....	1,500	20,000	Ms
Lockheed Vega Model 5B	ST	Spl Al	.....	.....	.....	.....	.....	275	.....	.....	.....	.....	.....	180	155	.....	.....	1,200	20,000	Ms
Lockheed Vega Model 2B	ST	Spl Al	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Parks P-1	ST	Spl Al	99″	Wi 26x 4	No	R	No	290	27.28	4.0	7.2	27.4	16.9	102	90	.....	.....	500	11,000	Ms
Parks P-11A	ST	Spl Al	65″	D 30x 5	Yes	R	No	285	36.2	4.0	7.2	27.4	16.9	125	110	.....	.....	2,000	18,000	Ms
Ryan B-5	ST	.....	.....	.....	.....	.....	.....	280	24.4	6.2	9.7	26.0	16.5	138	112	1,750	55	1,000	18,000	Gt
Ryan B-7	ST	Spl Al	10′	32x 6	Bx	Aer	Pn	280	24.4	6.4	11.1	27.5	17.5	150	120	1,700	60	1,350	20,000	Gt
Doyle O-2	ST	Spl Al	.....	.....	No	.....	No	165	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fairchild 42	ST	Spl Al	.....	Bx	Bx	Ol	Yes	290	24.8	4.0	11.0	30.0	24.5	130	109	.....	.....	700	15,300	Ms
Fairchild 71-A	ST	Spl Al	.....	Bx	Bx	Ol	Yes	332	34.0	4.0	11.0	30 0	24.5	135	110	.....	.....	675	15,300	Ms
Fairchild KR-31	ST	Spl Al	.....	.....	Yes	RD	No	296	.....	.....	.....	.....	.....	102	80	.....	.....	548	12,000	Ms
Fairchild KR-34A	ST	Spl Al	.....	.....	.....	RD	No	285	36.4	4.0	7.5	20.3	16.9	123	105	.....	.....	800	14,100	Ms
Fairchild KR-21	ST	Spl Al	.....	.....	.....	RC	No	193	17.5	4.4	5.5	12.9	8.6	113	90	.....	.....	775	15,000	Ms

A —Amphibion
Ad —Alclad
Aer —Aerol
Al —Axle
Ans —Anzani
Apl —Applied
Ar —Arena
Aw —Air Wheels
Ax —Axelson
B —Biplane
Bak —Bakelite
Be —Beam
Bo —Bolted
Box —Box spar
Br —Brownback
Bx —Bendix
C —Closed
Ca —Cable
Cd —Cord
Cg —Corrugated
Ch —Challenger
Cir —Cirrus
Co —Comet
Com—Compression
Con—Continental
Cq —Conquerer
Cs —Shock Cord
Cu —Curtiss
Cv —Conventional
Cy —Cyclone
D —Duralumin
Dep—Deperdussin
Du —Dual
Ex —Extra
F —Flying boat
Fab —Fabric
Fl —Flottorp
G —Glued
Ge —Genet
Go —Goodyear
Gr —Gruss
Gt —Gov't. test
Gy —Gipsy
H —Hamilton
He —Henderson
His —Hispano
Ht —Heat treated
Hw —Hess Warrior
Hyd—Hydraulic
Hz —Hartzell
I —"I" section
In —Internal
Ir —Irwin
J5 —Whirlwind
J6 —New Whirlwind
K —Kinner
L —Landplane
La-l—Ace
Lam—Lambert
Lb —LeBlond
Li —Liberty
Lk —Lockheed
Lmd—Laminated
Lr —LeRhone
Ly —Lycoming
M —Monoplane
Me —Metal
Mo —Monocoque
Ms —Mfr's Statement
N —New
Na —Navigation
O —Open
Ol —Oleo
Old —Oildraulic
Op —Optional
OX-5 —Curtiss
P —Paragon
Pe —Pedal
Pk —P-K screws
Ply —Plywood
Pn —Pneumatic
Pr —Push Rod
Pwh —P & W Hornet
Pwj —P & W Wasp Jr.
Pww —P & W Wasp
Q —Sesquiplane
R —Rubber
Re —Reed
Ro —Routed
Rus —Rusco
Rv —Riveted
S —Steel
Sa —Sausedde
Se —Sewed
Sc —Coil Springs
Scd —Screwed
Sd —Stamped
Sh —Sheet
Sk —Stick
Sol —Solid
Sp —Spruce
Spl —Split
Sr —Super Rhone
St —Standard
Str —Straight
Su —Supreme
Sy —Story
Ss —Ssekely
T —Tubing
Tr —Trombone
Trod—Treadle
Trs —Truss
Ts —Tacked and sewn
W —Wood
Wa —Warren Truss
War—Warner
We —Westinghouse
Wh —Wheel
Wi —Wire
Wl —Welded
Wr —Wright
Wt —Wind Tunnel
Y —Yankee
Z —Seaplane
* —Without engine

Specifications of American Commercial Airplanes

Including only planes with Approved Type Certificates—*AVIATION* does not assume responsibility for the figures given

Manufacturer	LANDING GEAR							AREA (sq. ft.)						PERFORMANCE						
	Material	Type	Tread	Wheels Type and Size	Brakes	Shock Unit L. S. and Tail	Tail Wheel	Wing	Aileron	Fin	Rudder	Stabilizer	Elevator	High Speed (M.P.H.)	Cruising Speed (M.P.H.)	R.P.M. at Cruising	Stall Speed (M.P.H.)	Climb at Sea Level F.P.M.	Service Ceiling (Ft.)	Performance Basis
Fleet Model I	ST	Spl Al	.....	.....	Op	Ol	No	195	.....	.....	.....	.....	.....	111	90	.....	.....	870	13,000	Ms
Fleet Model II	ST	Spl Al	.....	.....	Op	Ol	No	195	.....	.....	.....	.....	.....	113	90	.....	.....	870	13,000	Ms
Fokker F-10A	ST	Tred	15' 8"	.....	Yes	Ol, R	Op	850	.....	11.0	20.5	40.0	44.6	140	118	1,650	....	1,400	18,000	Gt
Fokker Universal	ST	Spl Al	10' 2"	Sa 32x 6	Yes	R	No	350	20.0	2.21	11.62	23.86	20.0	135	115	1,650	....	850	14,000	Gt
Fokker F-11A	ST	Spl Al	14' 5"	Bx 36 x8	Yes	R	No	548	26.0	26.6	15.4	39.0	36.0	112	95	1,650	....	700	.....	Gt
Fokker F-14	ST	Tred	12' 6"	Bx 36x 8	Yes	Ol	Yes	550	26.0	4.69	13.5	33.6	35.6	132	110	1,650	....	1,000	14,000	Gt
Fokker F-32	ST	Tred	20'	Bx 58x12	Yes	Ol	Yes	1,350	87.6	29.0	39.2	77.0	72.0	140	120	1,650	....	1,200	18,000	Gt
Ford 4-AT-E	ST	Tred	16' 9"	D	Own	Hyd	Yes	785	.....	.....	.....	.....	.....	130	107	1,600	57	920	16,500	Ms
Ford 5-AT-C	ST	Tred	18' 7"	D	Own	Hyd	Yes	835	.....	.....	.....	.....	.....	135	112	1,600	64	1,100	17,300	Ms
Ford 7-AT	ST	Tred	18' 7"	D	Own	Hyd	Yes	835	.....	.....	.....	.....	.....	134	110	1,600	60	880	14,100	Ms
Ford 5-AT-C-S	ST	Tred	14' 9"	D	Own	Hyd	Yes	835	.....	.....	.....	.....	.....	130	104	1,600	64	900	14,200	Ms
General Aristocrat	D	Spl Al	.....	.....	Bx	R Com	Yes	195	.....	.....	.....	.....	.....	110	90	.....	....	650	12,150	Ms
Great Lakes 2T-1A	Ht S	Spl Al	5'10"	Wi 24x 4	Bx	Ol & Sc	No	188	16.6	3.5	5.7	13.46	9.5	110	.....	.....	....	545	13,010	Ms
Inland S-300	Wl, ST	Spl Al	.....	.....	No	Hyd	No	144	.....	.....	.....	.....	.....	110	90	.....	....	.....	.....	Ms
Ireland N-2-B	ST	Spl Al	7'10"	Bx 32x 6	No	Ol	No	376	53.2	15.62	18.2	29.13	25.8	115	85	1,750	46	650	14,000	Ms
Ireland N-2-C	ST	Spl Al	7'10"	Bx 32x 6	No	Ol	No	376	53.2	15.62	18.2	29.13	25.8	120	100	1,750	47	1,000	16,000	Ms
Laird LC-R-300	S	Spl Al	.....	.....	Bx	RCd	.....	202	.....	.....	.....	.....	.....	175	135	.....	....	1,500	20,000	Ms
Lincoln PT	S	Spl Al	76"	26x 4	No	R	No	297	.....	.....	.....	.....	.....	105	90	.....	....	800	14,000	Ms
Lincoln PT-K	S	Spl Al	76"	26x 4	No	R	No	297	30.5	4.7	8.5	17.5	16.0	.....	.....	.....	....	.....	.....	Ms
Lincoln PT-W	S	Spl Al	76"	26x 4	No	R	No	297	30.5	4.7	8.5	17.5	16.0	.....	.....	.....	....	.....	.....	Ms
Metal G-2-W	.....	.....	.....	.....	Yes	Aer	.....	360	.....	.....	.....	.....	.....	135	112	.....	....	510	11,500	Ms
Mohawk Pinto	Ht S	Spl Al	8' 5"	Bx 24	Bx	Gr	No	145	11.9	5.3	6.7	15.5	11.12	115	95	1,700	....	1,100	18,000	Ms
Mohawk M-I-C	Ht S	Spl Al	8' 5"	Bx 24	Bx	Gr	No	145	11.9	5.3	6.7	15.5	11.12	115	96	1,700	....	1,100	18,000	Ms
Mono Monoprep	Ht S	Spl Al	.....	.....	.....	Ol Sc	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....
Mono Monoport	Ht S	Spl Al	.....	.....	Bx	OlSc	.....	133	.....	.....	.....	.....	.....	125	110	.....	....	1,000	20,000	Ms
Mono Monocoach	Ht S	Spl Al	.....	.....	Bx	Ol Sc	.....	222	.....	.....	.....	.....	.....	133	112	.....	....	1,200	18,000	Ms
New Standard D-29-A	ST	Spl Al	5'11"	26 x3	No	Ol R	No	245	21.5	3.6	9.9	19.5	13.5	95	75	1,000	46.7	880	14,800	Gt
New Standard D-25-A	ST	Spl Al	8'	30x 5	Sa	Ol R	Op	350	26.0	6.5	11.75	33.2	19.7	.....	.....	.....	....	.....	.....	.....
New Standard D-27-A	ST	Spl Al	8'	30x 5	Sa	Ol R	Op	350	26.0	6.5	12.75	33.2	19.7	.....	.....	.....	....	.....	.....	.....
Nicholas-Beasley Barling NB-3	ST	Spl Al	.....	.....	No	RCd	No	160	8.0	3.4	5.2	9.3	9.0	105	87	.....	45	600	15,000	Ms
Nicholas-Beasley Barling NB-3V	ST	Spl Al	.....	.....	No	RCd	No	160	8.0	3.4	5.2	9.3	9.0	105	87	.....	45	600	15,000	Ms
Nicholas-Beasley Barling NB-3G	ST	Spl Al	.....	.....	No	RCd	No	160	8.0	3.4	5.2	9.3	9.0	110	95	.....	45	800	17,500	Ms
Paramount Cabinaire 165	ST	Spl Al	.....	.....	Bx	Hyd	.....	309	.....	.....	.....	.....	.....	120	101	.....	....	850	12,000	Ms
Pheasant H-10	ST	Spl Al	5' 6"	D 22x 6	No	Ca	No	118	13.0	3.0	3.5	8.0	5.5	111	90	1,725	35	500	12,500	Ms
Pitcairn PA-7	Ht S	Spl Al	.....	Bx 30x 5	Bx	Ol	Yes	244	20.8	4.2	6.2	15.4	12.5	145	.....	.....	57	.....	.....	Ms
Simplex Red Arrow K-2-S	ST	Spl Al	.....	.....	Op	Hyd	.....	160	.....	.....	.....	.....	.....	125	110	.....	....	1,000	12,000	Ms
Simplex Red Arrow W-2-S	ST	Spl Al	.....	.....	Op	Hyd	.....	160	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....
Spartan C-3-165	Ht S	Spl Al	.....	.....	Yes	Sc Hyd	.....	291	25.0	5.3	7.81	20.6	15.0	121	100	.....	....	820	12,000	Ms
Spartan C-3-225	Ht S	Spl Al	.....	.....	Yes	Sc Hyd	.....	292	25.0	8.12	7.81	23.6	18.0	133	.....	.....	....	1,160	15,000	Ms
Spartan C-3-166	Ht S	Spl Al	.....	.....	Yes	Sc Hyd	.....	291	25.0	5.3	7.81	20.6	15.0	115	92	.....	....	800	11,000	Ms
Star Cavalier C	ST	Spl Al	.....	.....	.....	.....	.....	157	17.85	3.7	6.5	12.8	8.8	115	95	.....	....	800	16,000	Ms
Stinson SM-6B	ST	Spl Al	9' 8"	Bx 36x 8	Yes	Hyd	Yes	334	34.0	9.0	11.7	27.1	22.3	145	120	1,750	59	.....	18,000	Gt
Stinson SM-8B	ST	Spl Al	9' 7"	30x 5	Yes	Hyd	Yes	234	25.4	5.2	11.6	25.3	18.8	132	110	1,750	55	.....	.....	Gt
Stinson Sm-8A Jr	ST	Spl Al	9' 7"	30x 5	Yes	Hyd	Yes	234	25.4	5.2	11.6	25.3	18.8	128	104	1,700	55	.....	.....	Gt
Stinson SM-7A	ST	Spl Al	9' 7"	32x 6	Yes	Hyd	Yes	234	25.4	5.2	11.6	25.3	18.8	144	116	1,750	58	.....	.....	Gt
Swallow TP	S	Str Al	7'	Aw28x 4	No	R Cd	No	296	28.0	3.5	7.0	16.0	15.0	90	75	1,350	....	800	15,000	Ms
Swallow F-28-Ax	S	Spl Al	7'	30x 5	Op	R Cd	No	300	28.0	3.5	7.5	16.0	14.5	110	95	.....	....	.....	.....	Ms
Swallow TP-K	S	Str Al	7'	Aw28x 4	No	R Cd	No	296	28.0	5.5	7.0	16.0	15.0	100	85	.....	....	.....	.....	Ms
Swallow TP-W	S	Str Al	7'	Aw26x 4	No	R Cd	No	296	28.0	5.5	7.0	16.0	15.0	100	85	1,780	....	.....	.....	Ms
Texas Temple	S	Spl Al	.....	.....	.....	.....	.....	225	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....
United Aircraft & Transport Corp																				
Boeing 100	S, D	Str Al	75"	Bx 30x 5	Bx	Ol	No	228	13.8	1.8	8.2	19.9	13.4	165	140	1,600	55	.....	.....	Ms
Boeing 204	.....	.....	.....	.....	.....	.....	.....	470	38.4	14.5	17.1	26.0	28.0	133	110	1,625	60	.....	.....	Ms
Boeing 40-B-4	ST	Str Al	80"	Bx 36x 8	Bx	Ol	No	545	36.0	8.4	15.9	43.2	28.3	138	110	1,600	58	800	16,500	Ms
Boeing 80-A	ST	Tred	218"	Bx 54x12	Bx	Ol & Sc	OldSc	1,250	101.0	14.5	26.0	80.0	56.0	138	115	1,600	57	900	15,500	Ms
Hamilton H-45	ST	Spl Al	.....	.....	Yes	Aer	Yes	387	.....	.....	.....	.....	.....	135	115	.....	....	950	16,000	Ms
Hamilton H-47	ST	Spl Al	.....	.....	Yes	Aer	Yes	387	.....	.....	.....	.....	.....	140	120	.....	....	1,000	18,000	Ms
Sikrosky S-38	ST	.....	.....	.....	.....	Hyd	.....	720	.....	.....	.....	.....	.....	125	110	.....	....	880	18,000	Ms
Stearman M-2	ST	Spl Al	.....	.....	Yes	R Hyd	.....	436	.....	.....	.....	.....	.....	147	126	.....	....	950	15,000	Ms
Stearman LT-1	ST	Spl Al	.....	.....	Yes	R Hyd	.....	490	.....	.....	.....	.....	.....	134	110	.....	....	900	15,000	Ms
Stearman C-3-R	ST	Spl Al	.....	.....	Yes	R Hyd	.....	288	.....	.....	.....	.....	.....	133	110	.....	....	1,000	16,000	Ms
Stearman 4-E	ST	Spl Al	.....	.....	Yes	R Hyd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....
Viking Kittyhawk B-2	ST	Spl Al	.....	.....	Op	R Com	.....	233	.....	.....	.....	.....	.....	110	90	.....	....	650	.....	Ms
Viking Kittyhawk B-4	ST	Spl Al	.....	.....	Op	R Com	.....	233	.....	.....	.....	.....	.....	110	90	.....	....	650	.....	Ms
Waco 90	ST	Spl Al	.....	.....	Op	Ol Sc	No	286	.....	.....	.....	.....	.....	96	85	.....	....	50	13,000	Ms
Waco 165	ST	Spl Al	.....	.....	Bx	Ol Sc	No	286	.....	.....	.....	.....	.....	120	100	.....	....	700	18,000	Ms
Waco 225 str, w	ST	Spl Al	.....	.....	Bx	Ol Sc	No	288	.....	.....	.....	.....	.....	128	105	.....	....	1,200	19,000	Ms
Waco 225 tap. w	S	Spl Al	76"	Bx 30x 5	Bx	Aer	No	209	18.0	4.86	7.8	16.0	14.73	138	115	1,750	48	1,500	19,000	Ms

Ace	—La-1	Challenger	—Ch	Fabric	—Fab	Irwin	—Ir	Open	—O	Seaplane	—Z	Treadle	—Tred
Aerol	—Aer	Cirrus	—Cir	Flottorp	—Fl	Kinner	—K	Optional	—Op	Sesquiplane	—Q	Trombone	—Tr
Air Wheels	—Aw	Closed	—C	Flying Boat	—F	Lambert	—Lam	Paragon	—P	Sewed	—Se	Truss	—Tru
Alclad	—Ad	Coil Springs	—Sc	Genet	—Ge	Laminated	—Lmd	Pedal	—Pe	Sheet	—Sh	Tubing	—T
Amphibion	—A	Comet	—Co	Gipsy	—Gy	Landplane	—L	P-K Screws	—Pk	Shock Cord	—Cs	Walter	—Wa
Ansani	—Ans	Compressi.n	—Com	Glued	—G	LeBlond	—Lb	Plywood	—Ply	Solid	—Sol	Warner	—War
Applied	—Apl	Conqueror	—Cq	Goodyear	—Go	LeRhone	—Lr	Pneumatic	—Pn	Split	—Spl	Welded	—Wl
Arena	—Ar	Continental	—Con	Gov't. Test	—Gt	Liberty	—Li	Push Rod	—Pr	Spruce	—Sp	Westinghouse	—We
Axelson	—Ax	Conventional	—Cy	Gruss	—Gr	Lockheed	—Lk	P & W Hornet	—Pwh	Stamped	—Sd	Wheel	—Wh
Axle	—Al	Cord	—Cd	Hamilton	—H	Lycoming	—Ly	P & W Wasp Jr.	—Pwj	Standard	—St	Whirlwind	—J5
Bakelite	—Bak	Corrugated	—Cg	Hartsell	—Hs	Metal	—Me	P & W Wasp	—Pww	Steel	—S	Whirlwind (New)	—J6
Beam	—Be	Curtiss	—Cu	Heat Treated	—Ht	Mfr's. Statement	—Ms	Reed	—Re	Stick	—Sk	Wire	—Wi
Bendix	—Bx	Curtiss	—OX-5	Henderson	—He	Monocoque	—Mo	Riveted	—Rv	Story	—Sy	Wind Tunnel	—Wt
Biplane	—B	Cyclone	—Cy	Hess Warrior	—Hw	Monoplane	—M	Routed	—Ro	Straight	—Str	Wood	—W
Bolted	—Bo	Duralumin	—D	Hispano	—His	Navigation	—Na	Rubber	—R	Super Rhone	—Sr	Wright	—Wr
Box Spar	—Box	Deperdussin	—Dep	Hydraulic	—Hyd	New	—N	Rusco Aero Rings	—Rus	Supreme	—Su	Yankee	—Y
Brownback	—Br	Dual	—Dual	"I" Section	—I	Oildraulic	—Old	Sausedde	—Sau	Szekely	—Sz	Without Engine	—*
Cable	—Ca	Extra	— Ex	Internal	—In	Oleo	—Ol	Screwed	—Sod	Tacked and Sewn	—Ts		

Specifications of Airplanes not having Group I Type Certificates

AVIATION **does not assume responsibility for the figures given**

Manufacturer	Designation	Price at Factory	Type	Number Seats	Power Plant	Total Hp.	Span (Ft.)	Wing Area (Sq.Ft.)	Length Overall (Ft.)	Height Overall (Ft.)	Weight Empty (Lb.)	Pay Load (Lb.)	Gross Weight (Lb.)	Normal Range (Miles)	Wing Const.	Fuselage Const.	High Speed (M.P.H.)	Service Ceiling (Ft.)	Type of Control	Brakes	Type of Shock Absorber	Type Certificate Statis
Aeronautical Corp. of Am.	Aeronca C-2	$1,880	OML	2	Aeronca E-127	30	36′	144	20′	7′	375	150	700	315	W-Fab	Wl-ST	85	16,500	.....	.....	R	Apl
Arrow Aircraft & Motors Corp.	A2-100K	3,995	OBL	2	K	90	25′10″	183	19′ 6″	8′ 4″	1,004	220	1,550	300	W-Fab	Wl-ST	110	16,000	Sk	No	Cs	II
Bellanca Aircraft Corp.	Pacemaker 400	18,700	CML	6	Pww	420	48′ 8″	309	27′10″	8′11″	2,550	1,120	4,600	700	Sp-Fab	Wl-ST	150	20,000	Sk	Bx	Old	Apl
Bird Wing Commercial Aircraft Co.	Imperial No. 10	.....	OBL	3	Wr J-6-5	165	31′ 4″	304	24′ 2″	8′ 7″	1,458	372	2,270	.....	W-Fab	Wl-ST	125	15,000	Sk	Ex	.....	II
Breese Aircraft Corp.	B-6	15,000	OML	6	Wr J 6	300	41′	260	27′	10′ 6″	1,155	.....	2,550	550	W-Fab	Wl-ST	120	15,500	.....	Bx	Rus	Apl
Chance Vought Corp.	Corsair	.....	OBL	2	Pww	420	.....	320	24′ 7″	10′ 2″	2,300	.....	3,500	660	W-Fab	Wl-ST	152	22,000	Du	Bx	Ol	.....
Chance Vought Corp.	Corsair Seaplane	.....	OBZ	2	Pww	420	.....	320	28′ 6″	11′ 4″	2,600	.....	3,800	600	W-Fab	Wl-ST	148	22,500	Du	.....	.....	.....
Curtiss Aeroplane & Motor Co.	Kingbird	.....	CML	7–8	Wr J 6	450	54′ 6″	405	34′ 9″	10′	3,824	.....	5,824	442	D-Fab	ST-Bak-Fab	135	14,700	Wh, Pe	.....	.....	.....
Heath Airplane Co., Inc.	Parasol	975	OML	1	Heath	27	25′	110	17′	4′ 6″	280	.....	580	270	W-Fab	Wl-ST	70	12,500	Sk	No	R	.....
Irwin Aircraft Co.	F-A-1	1,165	OBL	1	Irwin-79	25	20′	105	13′ 6″	5′ 9″	275	75	500	250	W-Fab	W	85	10,000	Sk	No	R	.....
Metal Aircraft Corp.	G-2-H	23,500	CML	8	Pwh	510	50′	360	32′10″	9′ 6″	3,460	1,440	6,000	580	D	Wl-ST, D	140	14,000	Wh	Yes	Aer	.....
Paramount Aircraft Corp.	Cabinaire-110	7,200	CBL	4	War	110	33′ 2″	309	24′	9′	1,352	660	2,296	465	W-Fab	Wl-ST	103	9,000	Sk	Bx	Pn	Apl
Pheasant Aircraft Co., Inc.	Traveler A-1	1,495	CML	1	Own	55	31′ 6″	118	20′ 6″	6′ 3″	578	115	950	510	W-Fab	Wl-ST	106	12,500	Sk	No	.....	.....
Ryan Aircraft Corp.	Foursome C-1	10,900	CML	4	Wr J 6	225	39′ 3″	220	27′ 7″	9′ 9″	2,000	600	3,000	625	S-W-Fab	Wl-ST	130	16,000	Sk	Bx	Ol	.....
Stearman Aircraft Co.	C-4-A	.....	OBL	3	Wr J 6	300	38′	306	26′ 5″	10′ 2″	2,230	755	3,800	75	W-Fab	Wl-ST	143	15,000	Sk	Yes	R Hyd	Apl
Szekely Aircraft & Engine Co.	Flying Dutchman	2,000	OML	1	Sz	40	26	180	18′	6′ 6″	551	231	800	360	W-Fab	Wl-ST	90	11,000	Sk	No	Rus	Apl
Taylor Bros. Aircraft Corp.	"Chummy"	4,650	CML	2	K	90	34′	163	22′10″	7′ 6″	1,082	212	1,646	450	W-Fab	Wl-ST	110	15,000	Sk	Op	Ol	.....
Whittelsey Mfg. Co.	Avian	4,995	OBL	2	Clr	95	28′	254	24′	8′ 6″	910	.....	1,600	430	W-Fab	Wl-ST	102	17,000	Sk, Pe	No	R	.....

Canadian

Curtiss-Reid Aircraft Co. Ltd.	Rambler	.....	.....	2	Gy	100	22′ 5″	166	23′1¼″	8′	1,010	315	1,500	.....	D-Fab	Wl-ST-Fab	102	.....	Du Sk	.....	.....	.....

See previous pages for key

MANUFACTURERS' SPECIFICATIONS ON ENGINES AVAILABLE FOR COMMERCIAL USE AS COMPILED BY *AVIATION*

THE TABLE BELOW IS BELIEVED TO BE ACCURATE BUT *AVIATION* DOES NOT ASSUME RESPONSIBILITY FOR THE FIGURES GIVEN

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MANUFACTURER OR AGENT	Engine	Cooling System	Cylinder Arrangement	No. of Cylinders	Strokes per Cycle	Propeller Drive	Rated Hp. and R.P.M. at Sea Level	Maximum Hp. and R.P.M. at Sea Level	Weight Dry Without Hub or Starter	Weight Per Rated Hp.	Bore and Stroke (in.)	Compression Ratio	B.M.E.P.	Displacement (Cu.in.)	Frontal Area (Sq.Ft.)	Diameter of Mounting Ring or Distance Between Bearers (in.)	Height or Overall Diameter (in.)	Length Without Starter (in.)	Guaranteed Fuel Consumption at Rated Hp. Lb./Hp./Hr.	Oil Consumption Lb./Hp./Hr.	Valve Mechanism	Cylinder Construction (See Key)	No. Intake Valves Per Cylinder	Make Spark Plug Supplied with Engine	No. Exhaust Valves Per Cylinder	Type of Ignition	Make Ignition	No. Carburetors	Make Carburetors	Make Starter	Are Exhaust Manifolds Provided	Shipping Weight Crated	Dept. of Commerce License	Cost at Factory
Allison Engineering Co.	V1410	A	IV-45°	12	4	D	410-1800	430-1900	1000	2.44	4⅝x7	5.3	128	1410	....	17	46¾	78½	.55	.03	ohe	Al, S	1	BG	1	2B	De	1	Sg²	Eo	....	....	Y	.....
Allison Engineering Co.	VG1410	A	IV-45°	12	4	G¹	410-1800	430-1900	1125	2.62	4⅝x7	5.3	128	1410	....	17	.....	85½	.55	.03	ohe	Al, S	1	BG	1	2B	De	1	Sg²	Eo	....	....	Y	.....
Allison Engineering Co.	V1650	W	IV-45°	12	4	D	420-1700	450-1800	885	2.10	5 x7	5.4	122	1650	....	17	46⁷⁄₁₆	74¼	.53	.025	ohe	Al, S	1	BG	1	2B	De	1	Sg²	Eo	....	....	Y	.....
American Cirrus Engines	Cirrus Mark III	A	L	4	4	D	95-2100	98-2100	275	2.90	4¾x5½	5.4	122	310	....	18¾	36⅝	38¼	.54	.021	prr	Al, S	1	BG	1	2M	Sc	1	Sg	Op	Y	400	30	1,600
Axelson Machine Co.	Axelson A7R	A	Rad	7	4	D	150-1800	.....	430	2.87	4¾x5½	4.7	....	612	....	16¼	45½	35	.52	.017	prr	Al, S	1	RB	1	M	Sr	1	Sg	SAE	....	750	16	2,900
Brownback Motor Lab., Inc.	C-400	A	Rad. 8	6	4	...	90-1700	.....	273	3.03	4.13x4.93	4.8	10.7	397	....	13	37	.....	.56	.011	prr	Al, S	1	Ch	1	2M	BR	1	Sg	Op	N	....	13	1,840
Comet Engine Corp.	Comet	A	Rad	7	4	D	150-1800	.....	393	2.62	4¾x5½	5.1	....	612	....	17½	46⅞	35⅝	.....	.....	prr	Al, S	1	.....	1	2M	So	1	Sg	Be	....	800	9	.....
Continental Aircraft Engine Co.	A70	A	Rad	7	4	D	165-2000	183-2300	425	2.58	4⅝x4⅝	5.3	122	544	....	20	41¾	37¹⁵⁄₁₆	.55	.03	prr	Al, S	1	BG	1	2M	So	1	Sg	Op	Y	....	32	2,700
Curtiss Aeroplane & Motor Co.	OX-5	W	V-90°	8	4	D	90-1400	.....	375	4.17	4 x5	4.9	....	502	....	12⅞	.....	.....	.55	.030	prr	Mo, C	1	AC	1	1M	....	1	Z	....	N	....	....	Y	.....
Curtiss Aeroplane & Motor Co.	OXX6	W	V-90°	8	4	D	110-1900	.....	390	3.55	4¾x5	4.9	....	568	....	12⅞	.....	.....	.55	.030	...	Mo, C	1	.....	1	2M	....	....	....	....	N	....	....	Y	.....
Curtiss Aeroplane & Motor Co.	C-6A	W	L	6	4	D	160-1700	165-1750	420	2.62	4¾x6	5.2	133	573	....	15¾	39	57¹³⁄₃₂	.52	.015	ohe	Al, Al, S	2	AC	2	2M	Sp	....	Z	U	N	865	Y	.....
Curtiss Aeroplane & Motor Co.	D12	W	V-60°	12	4	D	435-2300	460-2500	680	1.47	4¼x6	5.3	135	1145	....	15¾	.....	56¾	.52	.015	ohe	Al, Al, S	2	BG	2	2M	So	1	Sg	Eo	N	1080	10	.....
Curtiss Aeroplane & Motor Co.	Conqueror	W	V-60°	12	4	D	600-2400	635-2450	760	1.26	5¼x6¼	5.8	130	1569	....	15¾	.....	56¾	.52	.015	ohe	Al, Al, S	2	BG	2	1M	Sp	2	Z	Eo	N	1060	6	.....
Curtiss Aeroplane & Motor Co., Inc.	Geared Conqueror	W	V-60°	12	4	G²	600-2400	625-2450	850	1.42	5¼x6¼	5.8	128	1569	....	15¾	.....	56⁴³⁄₃₂	.52	.015	ohe	Al, Al, S	2	BG	2	1M	Sp	2	Sg	Eo	N	1150	7	.....
Curtiss Airplane & Motor Co.	Chieftain	A	H	12	4	D	600-2200	615-2200	900	1.50	5⅝x5½	5.4	130	1690	....	23⅜	45¼	51¹¹⁄₁₆	.60	.025	ohe	Al, S	2	BG	2	2M	So	2	Sg	E	N	1325	8	.....
Curtiss Airplane & Motor Co.	Challenger	A	Rad. 8	6	4	D	170-1800	180-1800	420	2.47	5¼x4¾	5.2	124	603	....	19	41¾	35⁴³⁄₃₂	.55	.020	prr	Al, S	1	BG	1	2M	So	1	Sg	E	N	850	5	.....
Dayton Airplane Engine Co.	Bear	A	L	4	4	D	110-1550	120-1800	375	3.41	4½x7	5.3	118	445	....	16	38¾	54²⁷⁄₃₂	.525	.0125	ohe	Al, NI	1	BG	1	2M	BR	1	Z	N	N	550	11	1,450
Hallet Mfg. Co.	H-526	A	Rad	7	4	D	130-1800	.....	425	3.26	4¾x5	5.2	....	526	....	18½	46	37	.....	.....	prr	C	1	BG	1	2M	BR	1	Z	....	N	....	N	1,700
Irwin Aircraft Co.	Irwin 79	A	Rad	4	2	D	20-1700	25-2200	60	3.00	2¾x2¾	5.0	110	79	2.0	4⅝	23	11	.45	.0311	Au	As, Aa, S	1	RB	1	1M	BR	2	Wf	....	N	100	N	625
Kinner Airplane & Motor Corp.	K-5	A	Rad	5	4	D	110-1825	112-1860	285	2.58	4.25x5.25	5.0	....	372	....	14	44⅜	32¼	.55	.035	prr	Al, S	1	BG	1	2M	So	1	Sg Hy	Hd	N	500	3	1,800
Kimball Aircraft Corp.	Beetle, Model K	A	Rad	7	4	D	135-1850	150-2000	370	2.50	4¼x5¼	5.2	100	585	....	17	45	37¾	.54	015	prr	Al, NI	1	BG	1	2M	So	1	Sg	Eo	N	550	34	2,500
Lambert Aircraft Engine Corp.	Velie M-5	A	Rad	5	4	D	165-2000	.....	370	2.46	5 x5½	5.0	....	540	....	19¼	45	28²⁹⁄₃₂	.55	.035	prr	Al, S	1	Ch	1	2M	So	1	Z	Eo	N	420	4	1,050
Le Blond Aircraft Engine Corp.	60 Model 5-D	A	Rad	5	4	D	65-1950	69-1950	230	3.54	4¼x3¾	5.3	112	250	5.85	.....	32⅝	22⅝	.58	.013	prr	IC	1	.....	1	DM	So	1	Sg	Eo	N	460	12	1,230
Le Blond Aircraft Engine Co.	90 Model 7-D	A	Rad	7	4	D	90-1975	94-1975	285	3.16	4¼x3¾	5.3	109	350	....	.....	32⅝	22⅝	.58	.013	prr	IC	1	.....	1	DM	So	1	Sg	Eo	N	510	20	1,610
Lycoming Mfg. Co.	R-645	A	Rad	9	4	D	185-2000	.....	465	2.5	4½x4½	5.1	....	644	....	.....	42⅜	41¼	.55	.035	prr	Al, S	1	.....	1	8d	So	1	Sg	....	Y	....	27	.....
Menasco Motors Co.	B-2 Salmson	A	Rad	9	4	D	260-1500	278-1760	542	2.08	4.92x6.69	5.2	....	.....	....	.....	49⅛	38½	.42	.025	prr	Al, S	1	.....	1	2M	O	1	Z	....	....	....	....	3,250
Michigan Aero Engine Co.	Rover	A	LI	4	4	D	75-1975	86-2200	228	3.25	4.125x5	5.1	112	5 267	....	.....	31 7⁄8	37 1⁄2	.55	.018	prr	Al, NI	1	AC	1	2M	So	1	Sg	N	....	....	25	1,200
Packard Motor Car Co.	1A-2775	W	X-60°	24	4	D	1200-2600	1300-2700	1500	1.15	5⅝x5	7	150	2775	6.22	14¼	45½	78¹¹⁄₁₆	.52	.03	ohe	S	2	BG	2	4B	So	4	Sg	O	N	....	N	35,000
Packard Motor Car Co.	3A-1500	W	V-60°	12	4	D	600-2500	650-2700	760	1.26	5⅝x5½	5.5	140	1530	4.03	15⅜	38¹⁵⁄₆₄	62¹³⁄₃₂	.52	.015	ohe	S	2	BG	2	2M	So	2	Sg	Ae	N	1275	Y	12,000
Packard Motor Car Co.	3A-1500	W	V-60°	12	4	G	600-2500	650-2700	880	1.46	5⅝x5½	5.5	140	1530	4.03	15⅜	38¹⁵⁄₆₄	65	.52	.025	ohe	S	2	BG	2	2B	De	2	Sg	Ae	N	1390	18	17,375
Packard Motor Car Co.	3A-1500	W	V-60°	12	4	D	600-2500	650-2700	780	1.30	5⅝x5½	5.5	140	1530	4.03	16¼	38¾	62¹³⁄₃₂	.52	.025	ohe	S	2	BG	2	2M	So	2	Sg	Ae	N	1275	N	12,000
Packard Motor Car Co.	3A-2500	W	V-60°	12	4	D	800-2000	835-2100	1160	1.45	6¾x6¼	5.7	135	2539	4.8	18¼	36½	69¾	.52	.015	ohe	S	2	BG	2	2M	So	2	Sg	Ae	N	2150	19	15,625
Packard Motor Car Co.	3A-2500	W	V-60°	12	4	G	800-2000	835-2100	1380	1.72	6¾x6¼	5.7	135	2539	5.1	18¼	36½	76½	.52	.015	ohe	S	2	BG	2	2B	De	2	Sg	Ae	N	2340	N	19,375
Pratt & Whitney Aircraft Co.	Wasp	A	Rad	9	4	D	420-2000	450-2100	690	1.64	5¾x5¾	5.2	124	1344	....	23¾	.....	43¾	.55	.035	prr	Al, S	1	BG	1	2M	So	1	Sg	....	N	1150	14	7,200
Pratt & Whitney Aircraft Co.	Geared Wasp	A	Rad	9	4	G²	420-2100	.....	760	1.80	5¾x5¾	5.2	124	1344	....	23¾	.....	47	.55	.035	prr	Al, S	1	BG	1	2M	So	1	Sg	....	N	1300	....	8,200
Pratt & Whitney Aircraft Co.	Hornet	A	Rad	9	4	D	525-1900	.....	785	1.40	6¼x6⅜	5.0	123.5	1690	....	23¾	55¹⁄₁₆	44⅝	.55	.035	prr	Al, S	1	BG	1	2M	So	1	Sg	....	N	1400	15	8,500
Pratt & Whitney Aircraft Co.	Hornet B	A	Rad	9	4	D	575-1950	.....	810	1.4	6¼x6⅜	5.0	....	1860	....	23⅜	56¾	44⁹⁄₁₆	.55	.035	prr	Al, S	1	BG	1	2M	So	1	Sg	Eo	N	1425	28	8,500
Pratt & Whitney Aircraft Co.	Geared H'r'nt B	A	Rad	9	4	G²	550-1950	.....	885	1.6	6¼x6⅜	5.0	....	1860	....	23⅜	56¾	49¹⁄₁₆	.60	.035	prr	Al, S	1	BG	1	2M	So	1	Sg	Eo	N	1600	....	9,500
Pratt & Whitney Aircraft Co.	Hornet A	A	Rad	9	4	G²	525-1900	.....	785	1.49	6¼x6⅜	5.0	123.5	1690	....	23 3⁄8	54¾	44⅝	.55	.035	prr	Al, S	1	BG	1	DM	So	1	Sg	Op	N	1350	29	9,500
Quick Motors Co.	Quick-Radial	A	Rad	9	4	D	125-1450	.....	325	2.6	4.13x5.51	5	....	667	....	19¹¹⁄₁₆	36	36	.....	.....	prr	Al, S	1	Ch	1	1M	So	1	Z	....	....	....	....	1,750
Siemens & Halske A. G.*	Yankee "5"	A	Rad	5	4	D	83-1710	.....	246	2.96	4.13x4.72	5.3	....	317	....	14	39⅝	34	.52	.022	prr	Al, S	1	O	1	2M	O	1	8m	O	Y	693	Ex	2,100
Siemens & Halske A. G.*	Yankee "7"	A	Rad	7	4	D	113-1720	.....	308	2.72	4.13x4.72	5.3	....	443	....	14	39⅝	32	.52	.022	prr	Al, S	1	O	1	2M	O	2	8m	O	Y	726	Ex	2,500
Siemens & Halske A. G.*	Yankee "9"	A	Rad	9	4	D	128-1735	.....	382	2.98	5.94x4.72	5.3	....	517	....	14.6	40⅛	32	.52	.022	prr	Al, S	1	O	1	2M	O	2	8m	O	Y	800	Ex	2,527
Seekely, O. E., Corp.	SR-3	A	Rad	3	4	D	40-1800	.....	148	3.7	4¾x4¾	4.8	100	191	2.3	9⅞	.....	23¾	.57	.030	prr	C	1	.....	1	2M	BR	1	Z	N	N	205	....	765
Tips & Smith, Inc.	Super-Rhone	A	Rad	9	4	D	125-1450	.....	315	2.52	4¾x5½	5.2	....	667	4.75	11	.....	39	.31	.036	prr	S, C	1	Sp	1	1M	Dx	1	Z	....	....	400	N	2,250
J. Walter & Co.*	Walter 5	A	Rad	5	4	D	70-1600	.....	225	3.21	4.13x4.72	4.4	112	317	....	11.35	37	27.5	.50	.028	prr	Al, S	1	AC	1	2M	So	1	So	....	Y	500	Y	1,835
J. Walter & Co.*	Walter 7	A	Rad	7	4	D	95-1600	45.6-1900	280	2.95	4.13x4.72	4.4	108	444	....	12.6	37	28.5	.49	.026	prr	Al, S	1	AC	1	2M	So	1	Z	....	Y	580	Y	2,355
J. Walter & Co.*	Walter 9	A	Rad	9	4	D	135-1750	133-1650	352	2.59	4.13x4.72	4.4	112	572	....	14.56	39	33.5	.49	.026	prr	Al, S	1	AC	1	2M	So	1	DuZ	....	Y	670	Y	2,940
Warner Aircraft Corp.	Scarab	A	Rad	7	4	D	110-1850	120-1925	270	2.45	4¾x4¼	5.2	112	422	....	17	35½	27½	.50	.01	prr	Al, S	1	AC	1	2M	So	1	Sg	....	N	....	2	2,485
Wright Aeronautical Corp.	Whirlwind Five	A	Rad	5	4	D	165-2000	.....	370	2.46	5 x5½	5.0	....	540	....	19¼	45	28²⁹⁄₃₂	.55	.035	prr	Al, S	1	.....	1	2M	So	1	Sg	....	Y	850	23	3,000
Wright Aeronautical Corp.	Whirl'ind Seven	A	Rad	7	4	D	225-2000	.....	440	1.88	5 x5½	5.0	....	756	....	19¼	45	28²⁹⁄₃₂	.55	.035	prr	Al, S	1	.....	1	2M	So	1	Sg	....	Y	870	26	.....
Wright Aeronautical Corp.	Whirl'ind Nine	A	Rad	9	4	D	300-2000	.....	485	1.61	5 x5½	5.0	....	975	....	19¼	45	28²⁹⁄₃₂	.55	.035	prr	Al, S	1	.....	1	2M	So	1	Sg	....	Y	1000	21	4,800
Wright Aeronautical Corp.	Whirlwind J5	A	Rad	9	4	D	220-2000	225-2000	500	2.50	4¼x5½	5.2	123	788	....	19¼	45	33¾	.53	.035	prr	Al, S	1	AC	1	2M	So	1	Sg	....	N	1000	13	3,900
Wright Aeronautical Corp.	Cyclone R1750	A	Rad	9	4	D	525-1900	560-2000	760	1.52	6 x6¼	5.0	130	1753	....	23⅝	53¹⁵⁄₁₆	40⅝	.55	.035	prr	Al, S	1	BG	1	2M	So	1	Sg	....	N	1530	17	8,600
Wright Aeronautical Corp.	Gipsy	A	L	4	4	D	85-1900	100-2100	245	2.88	4½x5	5.0	....	318	....	11¹³⁄₁₆	....	45¼	.55	.010	prr	Al, C	1	.....	1	2M	So	1	Sg	....	....	500	....	.....

*— Engines of foreign manufacture
†— Rebuilt
a— Applied for
A— Air cooled
Aa— Aluminum alloy
Ae— Aeromarine
Al— Aluminum
AS— Ansani or Scintilla
Au— Automatic
B— Battery ignition
BR— Robert Bosch
Bs— Scintilla booster magneto
C— Cast iron
Ch— Champion
Cylinder Construction
first—head
second—walls or waterjacket
third—sleeve, if any
D— Direct
De— Delco
Du— Duplex
Dx— Dixie
DM— Dual Magneto
Eo— Eclipse
E— Ensign
Ex— Extra
G— Geared
G¹— 5:3 epicyclic gear
G²— 2:1 reduction gear
G³— 3:2 reduction gear
GE— General Electric
H— Hexagonal
Hd—Heywood
Hy— Holley
I— Inverted
Ic— Cast Iron
L— Cylinders in line
Mo— Monel
M— Magnetic
NI— Nickel Iron
N— No
Op— Optional
O— Own
Ohc— Overhead cam
prr— Push rods and rocker arms
Rad— Radial
Rad S— Staggered Radial
S. A. E.— S. A. E. Mounting
So— Scintilla
Sid— Scintilla—Dual Magneto
Sg— Stromberg
Sg¹— Stromberg NA-U5 duplex
Sg²— Stromberg NAS-8E
Sm— Sum
So— Solex
Sp— Splitdorf
S— Steel
U— U.S.L. Electric
V— Vee
W— Water cooled
Wf— Winfield
X— Extra
Y— Yes Z—Zenith

GENERAL NEWS

HERBERT F. POWELL, *News Editor*

Helium Controversy Temporarily Settled

Agree on Purchase of Navy Gas From Government Plant

WASHINGTON (D. C.)—Controversy regarding the government's helium policy is still hot, but the issue has been settled, at least temporarily, by agreement between Secretary of Commerce Lamont and Secretary of the Navy Adams that henceforth the Navy will purchase all the helium necessary to meet its requirements from the government plant at Amarillo, Tex. Acting in the belief that maintenance of a commercial source of supply is desirable from the standpoint of national defense, the Navy, heretofore, has purchased part of its gas from The Helium Company of Kentucky, at Louisville, the only commercial firm engaged in the production of the non-inflammable gas.

This, however, was brought to a conclusion in February when Comptroller General McCarl ruled that all deliveries made to the Navy since expiration of the last contract on Oct. 1, 1929, were out of order and that he would not authorize payment. The Helium Company's plants at Dexter, Kan., and Thatcher, Colo., have practically shut down. So far as can be determined, the Comptroller General's decision does not preclude the Navy from negotiating a new contract with The Helium Company, but this is regarded as only a remote possibility because Congress also appears to be set against this Navy desire to foster private industry.

Government Cost Challenged

The whole issue has been debated at length during recent weeks in hearings before House and Senate appropriation committees in connection with the appropriation of $306,190 to be made for the Amarillo plant in the new fiscal year, but it probably will be aired again at a hearing soon to be held by the House Committee on Mines on Representative Englebright's bill to appropriate an additional $90,000 to complete the purchase of surface and gas rights necessary to place control of helium production from the Cliffside structure at Amarillo entirely in the hands of the government. An item of $180,000 also is carried in the first deficiency bill for the current fiscal year. By allocation of these funds, the cost of the Amarillo project, totalling $2,200,000, will have been met.

When installation of the second unit is completed next June, the government plant will have a productive capacity of 24,000,000 cu.ft. per year. The output from the first unit in January totalled 1,030,000 cu.ft. of helium at a gross cost of $12.25 per thousand cubic feet, which is the rate charged to the Army and Navy. The government's cost figures are challenged by The Helium Company, whose price to the Navy was $34. On a basis of a production of 10,800,000 cu.ft. for the fiscal year 1931, The Helium Company fixes the government's cost at $46.92, if interest on invested capital, depreciation of plant, depletion of reserves and other overhead items are included. With an investment of $600,000, the company fixes its own cost on this basis at $28.37. Although these figures are disputed by the Bureau of Mines, the claim is made by the company that by purchasing its estimated requirements of 8,000,000 cu.ft. at the company's regular price of $34, the government can save $95,808 after making full allowance for all continuing government costs with the Amarillo plant closed down.

Commercial Stimulation Favored

From the Navy's standpoint cost is not the decisive factor in shaping policy regarding the helium supply. During the hearings on the Navy's appropriation bill for the present year, both Edward P. Warner, then assistant secretary of the Navy, and Admiral Moffett, chief of the Bureau of Aeronautics, declared, that in splitting orders for the Navy's required supply between the Bureau of Mines and The Helium Company, it was the Bureau's purpose to encourage commercial production of helium. Mr. Warner said that even if the company's price should be appreciably higher, he would still consider it to be in the ultimate interest of the government and of the lighter-than-air industry to stimulate commercial production.

This policy was abandoned, however, when Secretary Adams advised Secretary Lamont, in a letter dated Oct. 24, 1929, that in the interest of harmony, the Navy will procure after July 1, 1930, its entire quota of helium from the Amarillo plant if the Department of Commerce will accept the responsibility of deciding that it is to the best interest of the government. To which Secretary Lamont replied under date of Nov. 25, "the Department of Commerce is quite willing to accept the responsibility of handling the helium matter and feels sure that it can do so to the satisfaction of the Navy Department."

Navy Order Increased

The Comptroller General's subsequent decision had the effect of forcing the Navy to turn immediately to the government plant for its entire supply. The Navy has recently raised its original order for the current fiscal year upon the Bureau of Mines from 5,000,000 to 7,000,000 cu.ft. Helium stocks in the Navy's hands now total approximately 8,000,000 cu.ft.

The Helium Company claims that abandonment of the Navy's policy to encourage private production was forced by the Department of Commerce and is contrary to the letter and spirit of the 1927 law, which is interpreted by J. H. Howington, vice-president of the company, as indicating the purpose of Congress to keep the Bureau of Mines out of the helium business except when private enterprise fails to supply a sufficient quantity of helium of satisfactory quality at a price less than total government cost.

The lengthy arguments regarding comparative costs of the government and private operation are persuasive that the question is moot. But aside from this factor, the Bureau of Mines contends that exploitation of The Helium Company's properties in Kansas and in Colorado is not true conservation, as their fields are limited in extent and the rock pressure, which is directly proportional to the volume of helium-bearing gas, is extremely low. The Bureau claims that in the Cliffside structure it has the only extensive helium-bearing area in the United States. It is estimated that, at the present rate of consumption, the structure holds sufficient gas to supply the needs of the Navy and Army for more than 200 yr.

The Goodyear-Zeppelin Corp. has intervened in the present controversy with a view to assuring an adequate supply of helium for its developing lighter-than-air operations. Pointing out that under the existing law, the government's plant cannot sell helium to a private company, J. C. Hunsaker, an official of the corporation, urged, in a letter to Representative Wood, chairman of the House Committee on Appropriations, dated Jan. 30, that Congress should either permit the Navy Department to purchase half its helium requirements from The Helium Company until the commercial demand is large enough to keep the company in business, or declare helium to be a government monopoly that under appropriate regulation will undertake to supply helium to commercial lighter-than-air enterprise at a fair price. Mr. Hunsaker expressed the belief that the government's investment in placing helium extraction on a commercial scale should bear fruit in the establishment of a commercial industry.

Although pressure applied by outside organizations representing private industry may eventually result in taking the government out of the business of producing helium, there is no indication that this Congress will curtail the plans of the Bureau of Mines for full-scale operation of the Amarillo plant. The necessary appropriation for the next fiscal year, commencing July 1, has been approved by the House and is carried in the bill as reported by the Senate Committee on Appropriations. Since the bill was reported, the Senate committee has granted a hearing to J. H. Howington and E. H. Courtenay, vice-presidents of The Helium Company, but it is not likely that the bill will be amended on the Senate floor to restrict the operations of the government plant. It is probable, on the other hand, that the House Committee on Appropriations will cut the Navy's budget estimate of $300,000 for helium. If other circumstances had not intervened, appropriation of this sum would have permitted the Navy to purchase 8,823,000 cu.ft., or practically its whole supply from The Helium Company at a price of $34 per thousand cubic feet.

Insurance Bill on Falling Craft

ALBANY (N.Y.)—A bill has been introduced here and referred to the Committee on Insurance "to amend the insurance law in relation to loss or damage to property caused by falling aircraft." The measure would amend Section 110 on purposes of incorporation, thus caring for the writing of insurance against such loss or damage.

Hamilton Standard Firm Is Completely Established

HOMESTEAD (PA.)—All activities of the Hamilton Standard Propeller Corp. are now carried on in a three-story plant here near Pittsburgh under the direction of Arvid Nelson, formerly factory manager for the Milwaukee branch. The consolidation of operations which had been carried on both here and in Milwaukee, was supervised by E. E. Wilson, the new president of the corporation.

Other officials of the firm are as follows: Carl F. Schory, in charge of service; Frank W. Caldwell, former chief engineer of the old Standard Steel Propeller Corp., chief engineer of the new plant; Fred Weick, former chief engineer of the Hamilton Aero Manufacturing Co., assistant to Mr. Caldwell; J. R. Miller, auditor; Adam C. Wolz, head of the purchasing department; and W. S. Borland, assistant to the president.

The consolidation places under one roof all the special machinery and equipment of the Standard Steel and Hamilton plants, which had developed somewhat different processes of manufacturing similar propellers and hubs. In order to assist in further development, both the Milwaukee and Pittsburgh production lines were moved intact into the new building.

Personnel and machinery were simply transplanted, and it is intended to continue to manufacture under both processes until experience determines what the final manufacturing procedure shall be. The Standard Steel shop organization has remained intact, and about half of the Milwaukee personnel has been moved to Homestead. All the changes have been made without interfering in any way with production.

Business of the Hamilton Standard firm has continued good, and the consolidated company now has orders on hand for about three-months' production. It is hoped that as a result of the physical consolidation, manufacturing economies will be brought about.

An example of this is found in the new line of light-weight propellers for low powers, announced at the St. Louis Show. These small propellers have all the advantages of metal construction, and are available for immediate delivery at popular prices. Although they have been only recently announced, an excellent demand has followed.

The consolidated plant represents an investment of approximately $1,000,000. The corporation expects this year to do at least the volume of business done by its two components in 1929.

Use Diesel in Detroit-Miami Trip

DETROIT (MICH.) — Capt. L. M. Woolson, aeronautical engineer, Packard Motor Car Co., and Walter E. Lees, Packard test pilot, recently completed a non-stop flight from Detroit to Miami, Fla., in a Stinson-Detroiter, powered by the new 225 hp. Packard-Diesel radial engine. The craft, Woolson stated, covered the distance in 10 hr. 15 min., averaging 117.1 m.p.h., and consuming only $8.50 worth of furnace oil. In the Miami flight Captain Woolson employed the same engine—the company's first production diesel—that recently completed a 50 hr. Army test run.

Test Wasp-Powered Boeing Monoplane Fighter

EXPERIMENTATION with this parasol-monoplane fighter is now under way at Wright Field, Dayton, Ohio. This all-metal plane, which represents an initial departure from biplane practice in American pursuit planes, is fitted with a supercharged Wasp engine. The machine was built by the Boeing Airplane Co. at Seattle, Wash. Though data on performance is as yet confidential, some idea of the craft's capabilities may be gathered from the fact that but 10 hr. 1 min. elapsed flying time was required by Pilot Les Tower between Seattle, Wash., and Omaha, Neb., on the flight east. This gives an average speed in the neighborhood of 157 m.p.h. for the 1,575 mi. trip.

HIGH POINTS in the NEWS

▶ *Out of order.* Comptroller General McCarl says so concerning the purchase of all helium since Oct. 1, 1929, from The Helium Company by the Navy. Now Navy will buy it all from the government's plant.

▶ *Cord explains.* The why and wherefore of putting the Stinson Junior on the market for $5,775 is told by E. L. Cord.

▶ *D.A.C. and prices.* Due to refinements here, and more efficient production methods there, some planes of the Detroit Aircraft Corp. go up in price; others down.

▶ *Financial success, however.* Though attendance at the second annual Pittsburgh aircraft show did not reach 1929 figures, Ray Krimm, show manager, says it paid.

▶ *The girl's height; the man's speed.* Elinor Smith in a Bellanca breaks woman's world altitude record, ascending to somewhere between 30,000-32,000 ft.; Capt. Boris Sergievsky carries a 2,000 kg. load over a 100 km. course, in his Sikorsky, at 143.9 m.p.h., a world's seaplane record.

▶ *All-American growing.* New names of exhibitors for the Detroit All-American Show raises total to more than 250. Apparently there will be more than 100 planes on display.

▶ *No towing, please.* The Aero Branch has decreed thus—following glider towing accidents—unless you get special permission.

Airports and Airlines

▶ *St. Valentine's Day.* ...No doubt had something to do with the air mail poundage increase for February over January. A total of 555,176 lb. were carried, or 49,243 lb. more than in January.

Foreign

▶ *More pounds needed.* A supplementary estimate of £760,000 ($3,800,000) has been issued for the English air service. An anticipated deficiency of £244,000 ($1,200,000) is said to be the reason for total supplementary estimates to date for 1929 of £12,946,346 ($64,731,730).

Ratify Airparts–Ex-Cell-O Merger

DETROIT (MICH.)—The acquisition of Airparts and Tool Corp. by Ex-Cell-O Aircraft and Tool Corp., through an exchange of stock, has been approved by stockholders of the former company. Three-quarters of a share of Ex-Cell-O will be given for each share of Airparts class A, and one-half share of Ex-Cell-O for an Airparts class B share.

Second Pittsburgh Aircraft Show Ends

Report 12 Plane Sales; Attendance Put at 30,000

PITTSBURGH (PA.)—Although Pittsburgh's second annual aircraft show, ending last Saturday, showed a drop in attendance from the exhibition of 1929, it was a financial success, from the standpoint of Ray Krimm, director, and of the exhibitor, the Aero Club of Pittsburgh, under whose auspices the exposition was held.

Actual business done at the show was reported to approximate $37,000 not counting five planes which a branch agency agreed to take within a year. All local schools reported considerable increases in students.

Twelve planes were sold during the show, in addition to an aerial survey job and the placing of a special runway contract. The total attendance was put at 30,000.

Planes sold included seven Franklin Sport biplanes by the Franklin Aircraft Corp., five of which were two-place craft powered with Velie M-5 engines at $2,785, and two Franklin Sports, with Lambert 90 plants, costing $3,185. The machines have not been approved but the "C" has been guaranteed every purchaser by J. P. Bauer, vice president of the corporation. Bauer is a former Department of Commerce man and former member of the air service. The planes were reported sold to individuals, who made down payments of between $200 and $1,750.

Other Sales

The Morris Flying Service, located at Rodgers Field here, sold two Aeronca C-2 monoplanes, and bought two more from the Issoudun Sales Corp., Hudson, Ohio. The planes cost $1,880 flyaway Cincinnati. Morris was made Pittsburgh dealer for the planes. The twelfth plane, a Barling NB-3, was sold by the Dawson-Babcock Corp.

The Pittsburgh Aviation Industries Corp. sold a $6,000 aerial survey job, William J. Austin, sales manager announced, and Lieut. Samuel C. Eaton, head of Rodgers Field, gave a contract for a Tarmac-treated runway at the field, 2,100 ft. by 70 ft. to Major C. B. Shaffer, of the American Tar Products Co. here.

The Pittsburgh Airplane Sales Corp., took an order from Air Service, Inc., of Johnstown, for five planes of the Curtiss-Wright line all to be purchased in a year. It also sold three Russell Lobe parachutes.

A feature of show week was an all-day meeting of the Pittsburgh section of the aeronautic division, A.S.M.E.

Maj. Thomas G. Lanphier, spoke to the engineers on "Safety in Aircraft." Prof. A. H. Blaisdell, professor of aeronautical engineering at Carnegie Tech., presided at one session, and Thurman Bane, of The Aviation Corp., presided at the afternoon conference. Papers by H. G. Ritchie, General Electric Co., on "Advanced Airport Lighting," and by Wellwood E. Beall, on "Aspects of All-Metal Construction," were read.

The largest showing of planes was made by the Pittsburgh Airplane Sales Corp., with a Travel Air 4-D-10, Travel Air E-4000, Curtiss-Robin with J6-5; an OX Robin, DH Moth and an American Moth racer, which won the Class B race from Florida to Cleveland last summer. The firm also showed Pioneer instruments and a cut-down Wright engine in operation.

Pittsburgh Aviation Industries Corp., had a Thaden T-4 metal monoplane, Fairchild KR-21, a Fleet trainer, a cut-down Kinner engine in operation, and Irvin parachutes. Main Aeronautics Corp., displayed a Ryan six-place powered with a Wright J6-9, an Avian, and a Waco 225. Dawson-Babcock Corp., showed a Barling NB-3 a school model of a Curtiss PT-1, and a Wright engine, the two latter exhibits being loaned by the Carnegie Institute of Technology. The Pittsburgh-Stinson Sales Co., headed by Col. Harry C. Fry, exhibited a Stinson, Jr., with a Warner-Scarab, and the Morris Flying Service put in a Mono-Prep and an Aeronca. A new club plane Ford, powered with three Wasps, was displayed by the Stout Metal Airplane people. Warrior Aeronautic Corp., Alliance, O., presented a stripped Argo equipped with a Warrior engine.

Included in the exhibit of the Pittsburgh School of Aviation was a welded steel tube fuselage, made by students, the Akron "Condor" glider of the Baker-McMillen Co., Akron, and a Wright J-5 engine. Allegheny County showed charts and drawings of progress being made on the municipal airport.

It was announced by Pittsburgh Airways, Inc., that books good for 1,000 air miles have been placed on sale for $85, making the air trip between New York and Pittsburgh, $29.75, or $2.25 less than private room on a train.

Other exhibitors were the Curtiss-Wright Flying Service with a wind tunnel in operation, with any one permitted to fly the model free; Clifford Ball, a working model of the Adams air mail pickup; Pittsburgh Steel Co., airport protection fences; National Steel Fabric Co., steel reinforcement for hard runways and building walls; David Meeker, an open glider; Eastman Kodak Co., aerial cameras; Aerial Surveys of Pittsburgh, Inc.; aerial views: Penn School of Aviation, Aero Club of Pittsburgh; Air Corps U. S. Army; and the Hamilton Standard Propeller Corp.

Towing in Air Now Prohibited

WASHINGTON (D. C.) — Recent glider accidents has brought the Aeronautics Branch to issue a ruling prohibiting the towing of aircraft by other aircraft without special permission.

It is pointed out that this ruling will not necessarily stop the proposed trans-continental flight of Capt. Frank Hawks in a glider behind an airplane. Captain Hawks is regarded as one of the nation's best pilots of gliders. If his machine passes the inspection of the Department of Commerce, it is believed that he will be given permission.

Buffalo Exposition Opening

BUFFALO (N. Y.)—The Second Annual Aviation Exposition opens here in the Buffalo Auditorium, Saturday, March 22, for a run of a week.

Detroit Aircraft Corp. Revises Prices of Planes

DETROIT (MICH.)—Due to more efficient production methods and machinery, and the installation of more luxurious refinements in some planes, the Detroit Aircraft Corp. has announced a revision of prices.

Reductions have been made in the price of two Ryan models, three Parks craft, and the Lockheed Air Express, but there is an increase in the quotations for other planes. According to James Work, vice-president of the corporation, the Eastman Flying Yacht will have to sell for $9,985 instead of $9,595, certain additional improvements being the reason for this. With the safety belt included, gliders will now sell for $485, or $50 more than the former figure.

The new prices, quoted below, are f.o.b. Detroit or fly-away from the factory where they are manufactured:

	New Prices	Old Prices
Ryan (Color of finish optional if allowed eight weeks for delivery)		
C-1 Foursome 210 hp. engine	$9,985.00	$10,900.00
5-B Brougham 300 hp. engine	12,985.00	13,250.00
B-7 Brougham 425 hp. engine	16,985.00	16,900.00
(Special upholstery $150 extra)		
Parks		
P-1 90 hp. engine	$2,785.00	$3,165.00
P-2 150 hp. engine	5,585.00	6,000.00
P-2A 210 hp. engine	6,285.00	6,350.00
Lockheed (Color of finish optional if allowed eight weeks for delivery)		
Vega—convertible five and seven place	$18,985.00	$18,900.00
Sirius—including cowling and pants	18,985.00	18,500.00
Air Express—including cowling	19,985.00	21,250.00
Executive—including cowling and pants	19,985.00	19,250.00
(Special upholstery $200 extra)		
Eastman		
Sea Rover—three and four place	$9,985.00	$9,595.00
Gliders		
The Gull—including safety belt	$485.00	$435.00

Los Angeles to Get Rankin Offices

LOS ANGELES (CALIF.)—Transfer of executive offices of the Rankin System, Inc., from Portland, Ore., to this city, has been announced by Norman J. Normile, president. The Rankin System will undertake an immediate expansion program, it is stated, calculated to increase the present total of 60 aviation schools using the Rankin course of instruction, to approximately 200 by the end of 1930. Included in the expansion program is a plan to erect a factory in Los Angeles for the manufacture of the Davis safety control stick, and the establishment here of the system's major flying school.

Cirrus Announces New Engine

MARYSVILLE (MICH.) — American Cirrus Engines, Inc., now announces the American Hi-Drive Ensign, an air-cooled, four-cylinder in-line engine of inverted type. The manufacturer states that the plant develops 95 hp. at 2,100 r.p.m. Other specifications: Bore 4.33 in.; stroke 5.125; piston displacement 302 cu.in.; compression ratio 5.4-1. The manufacturer also states that geared, supercharged, and geared-supercharged Ensigns are available.

Add 120 Exhibitors To Detroit Show List

DETROIT (MICH.)—With the addition of 23 firms planning to exhibit aircraft, and 97 firms showing engines and accessories, the total number of exhibitors for the Detroit All-American Aircraft Show, April 5-12, has reached more than 250. Apparently more than 100 aircraft will be on display with the enlarging of the plane list by the following firms:

Ace Aircraft Mfg. Co., American Aeronautical Sales Co., Cessna Aircraft Corp., Curtiss-Wright Sales Corp., Fleet Aircraft Co., Ford Motor Co., General Airplanes Corp., Heath Airplane Co., Inland Aviation Corp., Ireland Aircraft, Inc., Lenert Aircraft Co., Loening Aeronautical Corp., Lincoln Aircraft Co., Mohawk Aircraft Corp., New Standard Aircraft Corp., Parks Aircraft Co., St. Louis Aircraft Co., Von Hoffmann Aircraft School., Towle Aircraft Co., Inc., Waco Aircraft Corp., Whittelsey Mfg. Corp., Bowlus Sailplane Co., Gliders, Inc. (D.A.C.)

Additional accessory and engine firms planning display follow: Aero News, Mechanics, Aeronautical Chamber of Commerce, Airplane Model League of America, Air Travel Guide, Aircraft Lumber Co., Aircraft Bureau (Detroit Chamber of Commerce), Aircraft Products Corporation of America, Allied Products Corp., American Airways, Inc., American LaFrance & Foamite Co., American School of Welding, Inc., American Tel. & Tel. Co., The Austin Co., Axelson Aircraft Engine Co., B. B. T. Corporation of America, G. B. Corp., Belden Mfg. Co., Bendix Brake Co., Bethlehem Steel Co., Black and Decker Mfg. Co., Boeing System, Breeze Corporation, Comet Engine Corp., Consolidated Air Travel Ticket Office, Crouse-Hinds Co., Curtiss Pneumatic Machinery Co., Curtiss-Wright Airports Co., Curtiss-Wright Flying Service of St. Louis, Detroit Free Press, Eclipse Machine Co., Egyptian Lacquer, Electric Storage Battery Co., Fleishman Transportation Co., Endicott Forging and Mfg. Co., Fairchild Aerial Camera Co., General Electric Co., Gruss Air Spring Co., Hall & Brown Wood Working Machinery Co., Hess & Culbertson, Illinois Watch Co., Indianapolis Tool & Mfg. Co., Lambert Aircraft Engine Co., Light Mfg. Co., Linde Air Products Co., E. A. Link, Johns-Manville Co., McQuay Norris Mfg. Co., Metallurgical Laboratories, E. B. Meyrowitz, Missouri Lamella Roof Co., National Air Pilots Association, National Indoor Model Contest (St. Louis Glider & Model Association), Never Fale Parachute Co., The Ohio Seamless Tube Co., Packard Electric Co., Pan American Airways, Inc., Parker Appliance Co., Pioneer Instrument Co., The Prospect Fire Engine Co., Pyle National Co., Radiomarine Corp. (W. G. Logue), Rainbow Light Co., Russell Mfg. Co., Russell Parachute Co., St. Louis Chamber of Commerce, St. Louis Public Library, Scientific American, Scintilla Magneto Co., Shell Petroleum Corp., Southern Aviation, Southwestern Bell Telephone Co., Stanavo Specification Board, Morton Spence, Stromberg Carburetor Co., Stuart Aero Products Co., Switlik Mfg. Co., Szekely Aircraft & Engine Co., T. A. T.-Maddux Air Lines, Texas Company, Timken Roller Bearing Co., Triangle Parachute Co., Tubular Rivet & Stud Co., Universal Aviation Corp., U. S. Post Office (Detroit), D. Van Nostrand (Aircraft Yearbook), Vellumoid Co., Western Enterprize Engine Co., Western Flying, Westinghouse Electric & Mfg. Co., Wings Photo Service, Woods-Faulkner Co., Wright Aeronautical Corp., Wright DeCoster Co.

Fire Destroys Doyle Plant

BALTIMORE (MD.)—The entire plant of the Doyle Aero Corp., a two-story frame structure at 3100 Elm Ave., was completely destroyed recently by a fire of undetermined origin. Three planes—two two-place machines owned by the company, and a plane owned by Raymond McNamara, were rolled out of the building and saved. The blaze originated on the second floor.

Reduce Price of Inland Sport

KANSAS CITY (MO.)—The Inland Aviation Corp. here has reduced the price on the Inland Sport from $5,975 flyaway Kansas City, to $4,985, according to Lieut. Willfred G. Moore, sales manager. It was this type of craft in which Lieutenant Moore recently broke the world's light plane speed record over a 100 km. closed course, with a speed of 126.95 m.p.h.

Michigan Code Protest Results in Mass Meeting

LANSING (MICH.)—As AVIATION goes to press, word is received that the Michigan Aircrafters Association, comprised of practically every operator, pilot, mechanic, and flight instructor in Michigan, has called a general mass meeting of its members, to be held in Detroit, on March 22.

The purpose of this mass meeting is to voice the objections and criticisms of the aircraft operators in Michigan toward the new air code recently adopted by the Michigan Board of Aeronautics.

Capt. Ray Collins of Detroit, who is director of the State Board, has accepted the Association's invitation to attend this meeting for the purpose of hearing the major complaints to be presented. Capt. Collins' remarks in accepting the invitation were: "The State Board and myself as well as my entire staff are open-minded and willing to make any reasonable changes that will tend toward placing aviation on a safe and sound basis, but we will not listen to any selfish arguments. We have designed our rules as near as reasonably possible after a set of legislative laws, but if we are working along too stringent a line on some of the rules we stand ready and willing to change them."

It is estimated that over five hundred persons affected by these regulations will attend, and that W. B. Mayo, chief engineer, Ford Motor Co., and Chairman of the State Board of Aeronautics, will also be present, providing he has returned from the West Coast.

Douglas-B/J Merger Under Way

BALTIMORE (MD.)—Reports indicate that the Berliner-Joyce Aircraft Corp. may be acquired by the Douglas Aircraft Corp., Santa Monica, Calif., through an exchange of stock. A letter sent out to stockholders of the latter firm by president W. W. Moss, called a special meeting at which it is expected Douglas may make an offer. The purpose of the meeting, however, will be to take action on the creation of a mortgage for land, buildings, machinery, improvements, and plane designs of Berliner-Joyce to secure a loan of not more than $200,000 at 6 per cent, for a period not exceeding one year. Outstanding shares of Berliner-Joyce consist of 37,918 shares of class A stock and 40,000 shares of class B. Its assets, as of last August, amounted to $678,345.

Cirrus to Sponsor 7,586 Mi. Air Derby

MARYSVILLE (MICH.)—An announcement from American Cirrus Engines, Inc., a division of Allied Motor Industries, Inc., tells of an air race, approximately 7,586 mi. long, to be sponsored by that concern providing not less than fifteen fliers enter the competition.

To be known as the All-American Flying Derby, with prizes totaling $25,000, it is planned that the contest start from New York on or about July 21. It is stated preliminary sanction has already been granted this event by the N.A.A., and the Cirrus engine company now has the prize money posted in escrow in a Port Huron, Mich., bank. Entrants will be required to post a $250 entry fee as evidence of real intent to compete, but this money will be returned later.

The race will be open to pilots of either sex and any nationality, the only requirements being that they possess flying licenses from some recognized government and conform to regulations of the N.A.A. as regards competitive flying. Planes may be of any style or make, but must be powered by an American Cirrus or an American Hi-Drive Ensign, made by American Cirrus Engines, Inc.

Course Described

The course of the race and the approximate distance between points as the course should be flown is New York to Atlanta, 800 mi.; to Houston, 790 mi.; to Mexico City, 730 mi.; to Dallas, 990 mi.; to El Paso, 525 mi.; to Los Angeles, 730 mi.; to Salt Lake City, 575 mi.; to Cheyenne, 390 mi.; to Omaha, 503 mi.; to Chicago, 426 mi.; to Montreal, 792 mi.; and to New York City, 335 mi.; a total of 7,586 mi.

It is tentatively planned to establish controls at about nine points on the route, including, of course, the key cities of Houston, Mexico City, Dallas, Los Angeles, Chicago, Montreal, and New York. Contestants will be required to check in at control points and to depart at half-minute intervals after a fixed hour in the morning.

Thus each lap, from control to control, will constitute a miniature race in itself, the winner being first to arrive at the checking point. Meantime the position in the derby of all the contestants will be apparent at all times in the record of elapsed time between controls.

Pending the formation of the final race committee, entries will be received by the chairman of the Temporary Race Committee, E. G. Rich, care of A. B. Leach & Co., Inc., 57 William Street, New York City.

Phillips to Supply Universal

BARTLESVILLE (OKLA.)—A contract has just been signed whereby the Phillips Petroleum Co. will supply Universal Aviation Corp. with its "77" aviation gas. The oil firm will deliver a minimum of 5,000 gal. a day to the various airports on Universal's routes.

E. L. Cord States His Aviation Views

Price Cut Fundamental In Move to Reach People

CHICAGO (ILL.)—With deep interest elicited by the reduction in price of the Stinson Junior plane, several requests have been received by E. L. Cord, head of the automotive interests controlling the Stinson firm, asking his views on the subject of plane manufacture, use, and merchandizing.

Through the P. P. Willis Corp., of Chicago, Mr. Cord has issued the following statement:

"When The Cord Corp. became interested in aviation through its connection with the Stinson Aircraft Corp., of Wayne, Mich., we were surprised at the number of inquiries which we received from all over the country. These inquiries were of two major natures. Many people congratulated us and indorsed this move upon our part. Others were surprised to think that we could take aviation so seriously. These two classes of inquiries seemed to represent the thinking of the country. Either people are greatly enthused over aviation or they are still dubious of it. There seems to be no middle ground.

Believes Planes Too Expensive

"Aviation to us is solely a means of transportation. We believe that changes are necessary in the industry itself as well as in the public's mind before this means of transportation is utilized by a widespread ownership of planes.

"In the industry we feel that planes have been too high priced, that 'aviators' have fostered an erroneous conception of the dangers of flying, that the public generally prefers to ride only in cabin planes, and that the purchase of a plane must be simplified and that learning to fly must be made easy for the individual.

"On the public's part we believe a great many of the doubts and misconceptions about air transportation will be erased from people's minds once they have actually experienced the ease, comfort, safety, and convenience which flying offers today.

"The foregoing briefly covers the major points in the policy actuating the Stinson company. With a foundation of more than sixteen years' experience in flying and manufacturing planes, and with many pioneering achievements to their record, the Stinson organization is qualified to assume leadership in this respect. Edward A. Stinson built in 1916 the first cabin ship capable of flying itself in the air, combined with starter, brakes, and heater. Behind the Stinson program today is engineering skill, manufacturing resources, financial strength, buying power and experienced management that enables Stinson today to do things impossible heretofore.

Saw Need for Changes

"Therefore, it is to be expected that Stinson would lead by introducing the first four passenger cabin ship in the $11,000 class for $5,775. When we determined upon this price we realized that it was not justified by the present volume of business. But it was our conviction that this among other changes had to come about quickly in order to put this means of transportation within the reach of the many people who have been waiting for it. This new, radically low price was based upon our belief that as the public learns how safe, comfortable and easy it is to fly, the demand for a stable, rugged, and dependable fly-itself type of ship would quickly justify the price. Although the announcement of this new policy and program has barely been made, our belief already has been more than vindicated.

"Another unit affiliated with The Cord Corp., the Lycoming Manufacturing Co., of Williamsport, Pa., has devoted more than two years to the development and perfection of radial aviation engines of both nine and seven cylinders. The union of a plane factory with an engine factory obviously effects advantages both in efficiency and economy. In addition, experts trained in production methods in our own affiliated factories, contribute invaluable assistance in production management and cost.

Cites Personal Experiences

"My own personal experience with flying naturally has had its influence in shaping our policies.

"There was a time a few years ago when I was no different from any other person who looks upon flying as something only for especially gifted 'bird men.' Despite the fact that many of the principal executives in our different companies are licensed pilots, I somehow never considered the advantages of air transportation in terms of my personal business and social life.

"But, as our business activities increased and additional factories in distant towns were acquired the time-absorbing problem of transportation became more acute. One of my associates was requested to purchase the safest, most reliable and most rugged plane on the market, in his judgment.

Finds Flying Easy

Then a competent pilot was employed. Imagine my surprise the first time I went up in my own ship when the pilot took his hands off of the control and asked me if I wanted to fly the ship myself. It was in this manner that I learned that aviation had progressed to the place where ships actually did fly themselves in the air. And that I could actually fly in the air the first time up. And the airplane proved easier to handle than driving a motor car.

"I soon found out that other business men had learned to fly and became licensed pilots in the same manner that I did.

"With our engine factory resources it was but a natural step that we should become interested in transportation in the air as an addition to our activities for transportation on land and water.

"It is my conviction that as people realize that any normal person can easily and safely handle a ship, and realize that special togs, goggles, etc., are as unnecessary in a closed ship as they are in a closed motor car, that transportation by air will rapidly increase.

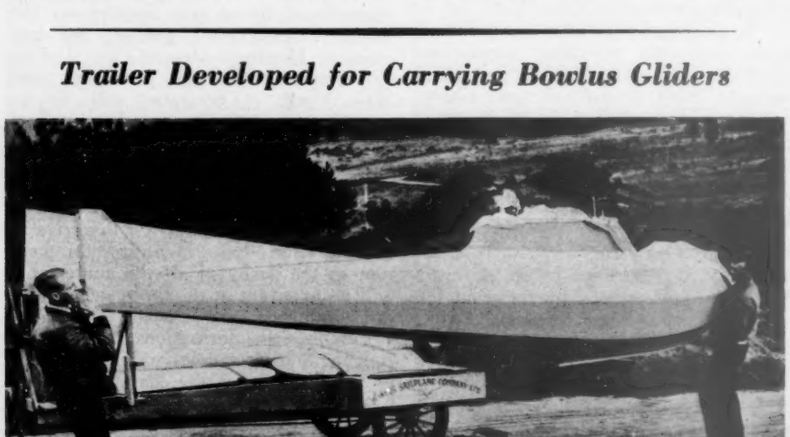
Auto and Aero Problems Compared

"In our advertising of the Stinson ship we are going to say that any normal person can fly the Stinson the first time up with a pilot. We could tell them that this ship takes off without the pilot holding the controls. But we do not mean to infer that any individual can take off and land a ship the first time, any more than one can drive a motor car downtown and park it the first time behind the steering wheel.

"In our judgment the time has come to quit talking about the 'future of aviation.' To us, aviation today is a practical, safe reality on a cost basis, comparable to that of transportation by fine motor cars.

"Those of us who have been in the motor car business have seen many necessary things, such as good roads, follow the public demand for motor cars themselves. In the same manner we think many of the problems of aviation will be solved. As more and more people utilize this means of transportation such problems as landing fields, etc., will become solved as the need increases."

Trailer Developed for Carrying Bowlus Gliders



THIS SPECIAL AUTO TRAILER has been developed by the Bowlus Sailplane Co., of San Diego, for transportation of the firm's gliders. The photograph, taken at Carmel, Calif., shows Colonel Lindbergh lifting a fuselage from the truck. The wings are carried in a side rack, while the wing-tip ailerons of the Bowlus craft are secured on the trailer beneath the rack for the fuselage.

Thirteen More States Voice Opinions on Riders

WASHINGTON (D. C.)—More views have been received concerning the validity of life insurance riders limiting liability in the case of policies issued to aviators and others subject to air travel risks. Jackson Cochrane, Colorado state insurance commissioner, stated orally that he sees no objections to life insurance policies for fliers which do not, however, cover air travel risks. A rider freeing a company from paying more than the reserve on a policy in case of an air accident would not be contrary to Florida state laws, affirms W. V. Knott, state treasurer and insurance commissioner. This is the same stand taken by George P. Porter, state auditor and commissioner of insurance of Montana; and Samuel B. King, South Carolina state insurance commissioner.

A. S. Caldwell, Tennessee state insurance commissioner, reports his department holds that companies have the right to exclude regular operators of aircraft such as pilots from coverage but that firms accepting fare-paying passengers must allow policyholders full coverage, except possibly for violation of the incontestable clause, the period of which extends for two years under the law of Tennessee.

Differing Views Expressed

Liability limiting riders for aviation risks incurred by persons engaged in aeronautics regularly have been approved in West Virginia, according to Edgar C. Lawson, state auditor and former insurance commissioner. Iowa has approved the form of rider allowing issuance of policies to aviators, but excluding aviation risks, states Ray Yenter, state insurance commissioner.

James J. Bailey, supervisor of life insurance companies in Louisana, considers policies are contracts between the insurer and the insured and that the state has nothing to do with prices charged or policy provisions. This is the same view held by William B. Harrison, Georgia state insurance commissioner, who has therefore ruled air risk riders are permissible.

Several States Disapprove

On the other hand, disapproval of an aero risk-precluding rider in Oklahoma has been made in a statement from that state's insurance commissioner, Jess G. Read. State insurance commissioner D. C. Lewis, of South Dakota, in his comments stated that he turned down four proposed riders on the subject submitted to him last summer. It was explained that in two cases, the provisions would have allowed air travel risk under the contract only to paying passengers, the reserve being payable, however, in case of death.

W. A. Tarver, chairman of the Texas state board of insurance commissioners, declared in a recent letter to a life insurance association that a rider reading thus:

"Death as a result of service, travel, or flight in any species of aircraft, except as a fare-paying passenger, is a risk not assumed under this policy; but, if the insured shall die as a result, directly or indirectly, of such service, travel, or flight, the company will pay to the beneficiary the reserve on this policy,"—may not be legally attached to pure life policies by virtue of the provisions of our statute, article 4733, subdivision 3, dealing with the things which a life policy may not contain.

"We will have no objections" Tarver continued, "to the exception of a loss from such a hazard as mentioned as to permanent disability or double indemnity feature, provided such restriction and exception specifically shows that it does not affect nor have any relation to the amount of the policy as a life policy only."

No Standard Provision in California

California's position is stated through E. Forrest Mitchell, state insurance commissioner, who says:

"The insurance laws of California, unlike those of New York and some other States, do not have a standard life policy provision. Some California companies have purposely excluded, by special rider, the aviation hazard. There is no standard provision, as above stated, in this State that would affect this question."

In a recent statement made relative to insurance policies covering aviation risks, Lloyd Dort, Nebraska state insurance commissioner, declared that in interpreting policies it is understood that risks not specifically excluded in the clauses are therefore included in the terms, but when there is any doubt as to the meaning of statements, the insured is favored in the resulting decision. Hence whether engaging in aviation does or does not affect the policy depends upon its wording.

This Should Get Rockefeller to Fly

MELBOURNE (FLA.)—To secure honorary membership in the Melbourne Golf and Country Club, owners and pilots of aircraft need only alight on the specially-prepared landing field adjacent to the club's eighteen-hole course. The membership, which includes all privileges, is good for one year, according to H. B. Fielding, who states that fliers will find the club one mile from the center of the city on the Cross State Highway.

[Recalling a certain golf course on Long Island, we are led to remark: "Roosevelt Field pilots please copy." —Ed.]

Budwig Compiles Pilot Requirement Questions

WASHINGTON (D. C.)—Director of Air Regulation Gilbert G. Budwig announces the compilation of 250 questions which illustrate the wide scope covered in the written examinations for various types of pilot licenses.

"The questions," Mr. Budwig said, "clearly show that the requirements for a Department of Commerce pilot license call for a broad knowledge of the subject of civil aeronautics, including the Air Commerce Regulations, the Air Traffic Rules, airplanes, airplane engines, meteorology, and navigation. In addition to the written examination, applicants are required to pass the necessary physical and practical flying tests.

"If an applicant cannot pass the written examination, even though he has learned to fly under an unlicensed status, he is indeed working under a great handicap which may result disastrously."

Examples of the questions applicants must answer follow:

May an unlicensed pilot in an unlicensed craft carry pay passengers from one state to another?
Is it necessary for an airplane bearing an advertisement to be licensed if flown between states?
What is the minimum altitude in flying over a football game?
May acrobatics be performed with passengers for hire?
How do you recover from a tail spin and how do you tell when a machine is about to spin?
How is the effect of propeller torque counteracted in the rigging of an airplane?
What are the advantages and disadvantages of dihedral in an airplane?
State the possible causes for the following: Nose heaviness, left wing heaviness, excessive vibration?
Name three causes for a loss of oil pressure?
Name four reasons for an air-cooled engine to overheat, though the lubrication system be functioning perfectly?
Name the four basic types of clouds?
What causes bumpy air?
Why is it dangerous to fly close to thunder heads?
Your compass course is 274 deg., the deviation is 4 deg. west, the variation 3 deg. west. What is your true course?
How would you know if the wind shifted while you were flying a compass course from one town to another?
What method is used to protect the inside of steel tubing in a fuselage against rust?
How do you "track" a propeller?
Define stagger wire, thimble, turtle back, walking beam, routed spar?
What is the rule regarding overtaking aircraft?
What day markings are required on airship mooring cables?
What is the international radio distress signal?
How many coats of dope should be applied to the fabric of a newly-covered wing?
What are convection currents?

Test Special S-56 Cabin Cover

NEW YORK (N. Y.)—A three-place Savoia-Marchetti is being tested with a glass-enclosed cockpit, the American Aeronautical Corp., manufacturer of the craft announces.

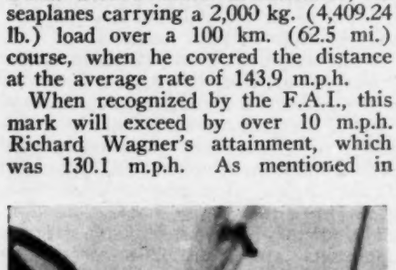
Ozark Firm Orders 5 Eagles

KANSAS CITY (MO.)—American Eagle announces reception of a five-plane order, from Finley Henderson, president of Ozark Flying Service, Inc., Siloam Springs, Ark.

Sergievsky Sets New 2,000 Kg.-100 Km. Mark

NORTH BEACH (L. I., N. Y.) — Capt. Boris Sergievsky, chief Sikorsky test pilot, flew the Hornet-powered S-38 to a new world's record on March 13, for seaplanes carrying a 2,000 kg. (4,409.24 lb.) load over a 100 km. (62.5 mi.) course, when he covered the distance at the average rate of 143.9 m.p.h.

When recognized by the F.A.I., this mark will exceed by over 10 m.p.h. Richard Wagner's attainment, which was 130.1 m.p.h. As mentioned in



Capt. Boris Sergievsky

AVIATION last week, Sergievsky had previously broken the American mark for the course by covering it at a 132.5 m.p.h. speed, but not being at least 5 m.p.h. faster than the German's mark, this would not have been accepted by the F.A.I. as a new world's record.

As previously, Capt. Sergievsky flew between Execution Point and Fairfield, Conn., which is the same course he will follow in attempts to better the 500 km. seaplane speed record with a 1,000 kg. load.

In the afternoon of March 13, Sergievsky took off from North Beach in the S-38 with a 1,000 kg. load, to better the altitude record of 20,961 ft., held by Franz Kneer, Germany, and made in November, 1928. Sergievsky's altimeter stopped functioning around 12,000 ft., but the official barograph indicated he had ascended to approximately 20,000 ft. The barograph was then forwarded to Washington by Maj. Luke Christopher, secretary of the N.A.A. Contest Committee, who officially observed the flights.

It has been announced that Capt. Sergievsky reached 19,065 ft. in his altitude record attempt on March 4, for seaplanes carrying 2,000 kg. This mark resulted from official calibration of the barograph and, therefore, as first reports stated, Lieut. de Vaisseau's record of 15,837 ft., made in France on May 15, 1929, was far surpassed.

Special engine cowls devised by engineers of the Sikorsky company were used on the 575 hp. Hornets of the S-38 in the various speed and altitude flights. In appearance, these devices follow the lines of the English Townend Ring cowling developed by Sir W. G. Armstrong Whitworth Aircraft, Ltd.

Approve More Planes, Schools

WASHINGTON (D. C.) — Approved type plane certificates Nos. 299 and 300, respectively, have been issued for the following planes, according to make and designation, type, power plant, weight empty, useful load, and gross weight: Bach 3-CT-9S, nine-place closed monoplane, two Wright J6-7's, one Wasp, 5,193 lb., 2,807 lb., 8,000 lb.; and Lockheed Model 8 Sirius, two-place open monoplane, Wasp, 2,974 lb., 1,626 lb., 4,600 lb. Two approved type certificates have been granted the following schools: Curtiss-Wright Flying Service, 1360 Main St., and Buffalo Municipal Airport, Buffalo, N. Y., ground and flying, for Transport, Limited Commercial and Private licenses; Curtiss-Wright Flying Service, Port Columbus, Columbus, Ohio, ground and flying, for Transport, Limited Commercial, and Private licenses.

Elinor Smith Breaks Woman's Altitude Mark

VALLEY STREAM (L. I., N. Y.)— By reaching a height recorded as 30,000 ft. by one barograph and 32,000 ft. by a second, Elinor Smith, a well-known young aviatrix, shattered the woman's altitude record here on March 10, in a Wright J6-9 Bellanca. The flight was officially observed by the National Aeronautic Association for the Federation Aeronautique Internationale.

The two sealed barographs were later sent to Washington where the announcement of the official height reached will be forthcoming as soon as the instruments have been calibrated.

It is understood that the late Marvel Crosson held the previous altitude mark of 23,996 ft., though this figure was not declared official at the time as the F.A.I. did not then recognize women's records as separate from those made by men. The first woman's altitude mark, which has been submitted to the F.A.I. for approval, was made on Nov. 18, 1929, at San Diego, Calif., by Ruth Alexander, who ascended to 15,718 ft.

Davis Orders 50 Kinners

LOS ANGELES (CALIF.)—Kinner announces reception of an order for 50 K-5 engines from the Davis Aircraft Corp., Richmond, Ind., the plants to be used in the Davis D1-K two-place monoplanes.

"QUOTES"

"Selling airplanes to the public isn't half the job that selling autos used to be. It was harder to get people to step into the first one-cylinder auto than it is to get folks to ride in planes."—H. E. SIDLES, Sidles Airway Corp.

"Women, the greatest hindrance to the advancement of aviation, must not only become 'air conscious' but 'air minded.' Women must overcome their prejudice to the extent of accepting aviation as necessary to commerce and of permitting members of their families free use of air transport."—JOHN H. HARRISON, Technical Instructor, Sky Harbor, Phoenix, Ariz.

"The mule, finally, will be the only rival of the airplane for safe transportation in heavy fog."—LIEUT. JAMES DOOLITTLE, Shell Petroleum Corp.

"The best thing that can happen to a young aviator is an accident—not a bad accident, but one sufficient to jar him and convince him that flying in not an occupation in which to take foolhardy chance. These lads who have had only 10 to 20 hr. in the air are too 'cocky,' but if they live long enough they get over it."—LIEUT. ROBERT L. O'BRIEN, Massachusetts State Supervisor of Aviation.

"Most persons think of flying as the *speediest* method of travel. As a matter of fact, the outstanding feature of air travel is *comfort*. Not even an ocean liner can give one such a sense of velvety smoothness as one of the big tri-motored liners of the air."—*Cosmopolitan* MAGAZINE TRAVEL BUREAU.

"I find the average airplane dealer entirely too prone to sit in his hangar office and let business come to him. . . . The motor car dealer is the ideal aircraft salesman. He has the floor space to properly display an airplane in the place where people will see it. There are more people—almost 100 to 1—on the city streets than at the airports, and if we can bring the planes to them we can make a big step toward selling them."—MAJ. J. CARROLL CONE, Sales Manager, American Eagle Aircraft Corp.

Plan Refuel Flight to Argentina

NEW HAVEN (CONN.) — A special Stinson-Detroiter monoplane, powered with a Pratt & Whitney Wasp engine and fitted with tanks to care for 950 gal. of fuel, is poised at Bethany Field, this city, in preparation for an ambitious attempt—a non-stop refueling flight to Buenos Aires, Argentina. The craft, called "The K of New Haven" after the Kolynos Co., sponsor, will be commanded by Capt. Herbert C. Partridge, who will be accompanied by Lieut. George R. Pond and C. P. Oleson. Havana, Cuba; Lima, Peru; and Santiago, Chile, have been designated as refueling points.

BRIEFLY

N.A.T. is continuing flight tests of the Guardian Air automatic pilot developed by Otto W. Greene. With a new gyroscopic rudder control, a successful flight was recently made "hands off" between Chicago and St. Louis.

P. I. Baranov and A. N. Toupolev, of the commission appointed by the Civil Aviation Council of U.S.S.R. to make a tour of manufacturing plants in this country, recently inspected the new Baltimore plant of Glenn L. Martin Co.

More than 800 packages from Nugent's Department Store, St. Louis, Mo., were delivered to nearby cities by plane in a recent demonstration.

Free flight instruction sufficient to enable the student to secure a private pilot's license is offered by North Shore Airways, Boston, to every purchaser of an Arrow Sport plane. Mrs. Bernson, wife of the general manager, is acting as sales manager.

Granville Bros. Aircraft Corp., Springfield, Mass., is starting production of six Gee Bee planes.

Pointing out that prospective purchasers of planes would be more favorable to immediate action when stimulated by an air tour run in the spring, when good flying weather is being ushered in, rather than the fall, when it is coming to a close, Nebraska operators have decided that the second annual state tour will be held in May or June.

A Fairchild 71 seaplane operated by Alaska Washington Airways, Ltd., has been held by the sheriff at Vancouver, B. C., in connection with a claim for salvage in Admiralty Court made by J. H. Burton, for towing plane and passengers to safety after it had struck an iron buoy in taking off. Jurisdiction of the Admiralty Court over seaplanes has yet to be determined.

An air show will be held April 19 at Dennison Airport, Quincy, Mass.

Anthony H. G. Fokker recently arrived back in this country from a visit to Europe.

Lieut. Apollo Soucek has been given the Spartan Award as the Oklahoman performing the most outstanding aeronautical achievement in 1929.

Warrior Aeronautical Corp., Alliance, Ohio, has announced plans for producing a two-place power glider to cost about $1,500.

Special equipment for testing gasoline under flight conditions has been installed in Phillips Petroleum Co.'s Wasp-powered Travel Air, in cooperation with Natural Gasoline Association of America.

F. L. Habbel, vice-president of the Bavarian Airplane Co., builder of the Messerschmitt planes, arrived recently in this country on the "Bremen." He will attend the All-American Aircraft Show at Detroit.

The Air-Land Manufacturing Co., Vancouver, B. C., of which W. E. Anderson, formerly of the Hayes-Anderson Co., Limited, motor truck manufacturers, Vancouver, is chief stockholder, is erecting a plant near Vancouver to assemble flying boats.

Production has been materially speeded in the Timm Aircraft factory at Los Angeles through the use of metal holding clamps of special design manufactured by Knapp and Vogt, Grand Rapids, Mich. These clamps are used for holding fairing members or small parts in place on the primary fuselage structure, and in general, wherever it is necessary to temporarily clamp a part in place during fabrication, the clamps being removed as quickly as the permanent attachment has been effected.

The Stone Fog Light Corp., Los Angeles, is preparing to undertake production of the various Stone light units, all of which incorporate a patented lens having valuable fog penetrating and other properties. Lights will be manufactured for aviation, automotive, marine, and medical use.

Arrangements are underway at Des Moines to form a company known as the United Air Activities, Inc., which will bring together the Bolte Aircraft Co., Des Moines, and certain interests in Newtown. Plans call for the utilization of a 100x250 ft. factory, near Newton, where land will also be available for student training purposes and an airport. A Department of Commerce approval was recently granted for the low-wing, two-place plane manufactured by the Bolte firm, after 14 mos. experimental work.

An extensive aerial tour covering Mexico, Guatemala, Salvador, Honduras, and Nicaragua, has been completed by Edward F. N. Deeds, general manager of Simmons Aircraft Division, Steel Incorporated. The trip, made in a Butler Blackhawk, was flown in the interests of plane and accessory manufacturers for which Simmons is export distributor. Accompanying Mr. Deeds was R. W. Grigsby, test pilot of the Spartan Aircraft Corp., who flew a Spartan C-3.

Wright Aeronautical Corp. has omitted its regular quarterly dividend of $.50 on common stock due Feb. 28.

Dr. Hugo Eckener has sailed from Germany for New York City. His stay in this country will be about a week and will include visits to Akron and Washington, D. C.

The Boeing eighteen-passenger transport plane, which ordinarily takes off fully loaded after a 1,000-ft. run, requires 1,800 ft. to take off from the airport at Cheyenne, Wyo., which is 6,200 ft. above sea level. The company reports that 74 Boeing planes are now in regular transport operation on six lines.

Aviation Corporation of the Americas and subsidiaries report a net loss for 1929 of $317,412 after depreciation, taxes, and other charges, including amortization of development expenses. Total assets as of Dec. 31 were put at $6,662,410.

Memphis (Tenn.) Municipal Airport was dedicated March 15.

TRADE TIPS

It has been reported that

The Temple Flying Club, Temple Tex., is planning to purchase a plane.

Vancouver, B. C., will shortly call for bids for a caterpillar tractor to be used for grading and ground conditioning in its temporary and permanent airports.

Mayor Jack Pearce of Galveston is expected to call soon for bids on a hangar to be erected at the city's recently acquired 120-acre municipal airport site.

Lighting equipment for the municipal airport of Daytona Beach is to be purchased by the Airport Supervisor, City Commission, Daytona Beach, Fla.

N.B. Additional information concerning trade possibilities will be found in the column headed "Airport Construction Projects."

Schools and Colleges

CENTRAL MICHIGAN AIRCRAFT CO., a recently organized limited commercial school at Flint, reports an enrollment of sixteen students.

CHALLENGER FLYING SERVICE, East Detroit, has started a school at the Gratiot Airport, with J. W. Martin as manager.

CUSHMAN FLYING SCHOOL, subsidiary of the Scott Engineering Co., Kalamazoo, has started operations as a private pilots' training school at the Kalamazoo Municipal Airport.

KRAJENKE FLYING SERVICE, Detroit, will offer a private flying course at Gratiot Airport.

MICHIGAN AERONAUTICAL CORP. is the name under which the Knapp Flying Service, Ypsilanti, has been reincorporated. The company will operate a training school for private pilots from the Ypsilanti Airport.

NORTH TEXAS AIR COLLEGE, INC., Dallas, opened recently at Love Field, with William Neilson as general manager. Courses leading to all three licenses will be offered.

UNIVERSITY OF OKLAHOMA will offer a course in the construction of gliders.

SOUTHERN AIRWAYS SCHOOLS have taken over the training activities recently relinquished by Southern Air Transport, Inc., at Winburn Field, San Antonio. The school has an average of about 40 students in training.

WEST AMERICA AIR SCHOOLS, LTD., Oakland, is constructing buildings for another flying school at Pittsburg, Calif.

TURNER-EVANS SCHOOL OF FLYING, Kansas City, Kan., plans to open a flying school exclusively for negroes near Muncie, Kan.

VANDERBILT UNIVERSITY, Nashville, Tenn., announces a course in aviation in the school of engineering. Arrangements have been made with Interstate Airlines to give students practical flying instruction.

PERSONNEL

CHARLES DEEDS has been elected to the board of directors of Pratt & Whitney Aircraft Corp., Hartford, Conn.

ELMER DAVIS has been made instructor in communications work for Boeing School of Aeronautics, Oakland, Calif. W. E. BEALL has been appointed instructor of navigation and meteorology, and JOHN E. YOUNGER, associate professor at University of California, is giving lectures on materials of aircraft fabrication and elements of design, at the Boeing school.

F. HETHERINGTON, formerly with N.A.T., has been made traffic manager at Fort Worth, Tex., for S.A.F.E.

JOHN C. NULSEN, general manager of Ryan Aircraft Corp., has been placed in charge of sales of all products of Detroit Aircraft Corp. in the Middle West. JOHN E. PRATT has been appointed chief demonstrator of the Gliders division of the company.

John C. Nulsen

AMORY B. BRONTE, head of the aviation department of Association Oil Co., has been elected to the board of directors of Alaska-Washington Airways, Seattle, Wash.

CAPT. W. B. WRIGHT, adjutant at Kelly Field, Tex., has been ordered to Kansas City in July to become instructor with the Air Corps Reserves there.

WILLIAM HOTTLE has been made instructor and pilot for Tyler Aviation Service, Tyler (Tex.) Municipal Airport.

PVT. CHARLES B. WHITEHEAD, recently at Brooks Field, San Antonio, Tex., has been appointed Captain in the aviation service of Peru, to be in charge of naval engines and planes.

LIEUT. WILL W. WHITE, who recently set a record of 5 days, 5 hr. elapsed time flying a Lockheed plane from New York to Buenos Aires, will join the aviation department of Standard Oil Co. (N. J.) as chief test pilot.

NEWTON D. BAKER III has joined the sales staff of Curtiss-Wright Flying Service at Cleveland, Ohio.

CHARLES W. SHORT, JR., manager of Tulsa (Okla.) Municipal Airport, has been made temporary chairman of the south central division of the airport section, Aeronautical Chamber of Commerce.

MAJ. JOHN S. CHASE has been reappointed medical member of Colorado Aeronautical Commission. PHILLIP H. PHILBIN, vice-president of Midcontinent Air Express, has been appointed a member for three years.

JOHN L. BAKER has resigned from the aviation staff of Standard Oil Co. (N. J.) to become representative of Kendall Refining Co. at Kansas City, Mo.

S. B. STEERS, formerly operations manager for Skyways, Inc., Detroit, Mich., has been appointed state aeronautical inspector.

J. DIXON DAVIS has joined the instruction staff of Burns Flyers, Detroit, Mich.

C. R. BAILES, formerly with Universal, has been appointed chief pilot and western division manager of S.A.F.E. at Big Spring, Midland, and Sweetwater, Tex.

ROBERT ECCLES has been made pilot for Standard Airlines, Los Angeles, Calif.

HOWARD PARKINSON has been appointed instructor on engines at the Minneapolis division of Universal Aviation Schools.

DILLARD HAMILTON has resigned as assistant to Col. E. E. Mouton, Department of Commerce supervisor for the western district. He is succeeded by FLOYD F. ROBERTS.

A. L. MCGUISTION has been appointed U. S. Weather Bureau observer at Tulsa, Okla.

R. S. DEERING has been appointed general manager of Verville Aircraft Co., Detroit, Mich.

DOUGLAS KEENEY, ground school instructor at the Standard Flying Schools, Los Angeles, has been appointed state examiner for aviation and industrial teachers in California.

C. N. JAMES, veteran mail pilot with Western Air Express, has been appointed assistant general superintendent in charge of flying personnel and dispatching. James was one of the four pilots who comprised the complete flying personnel of Western Air Express when that company began operations on April 17, 1926.

GORDON WARNER, of Bristol, has been appointed manager of the new East Bristol (Conn.) Airport. The new field will be ready for use the last of this month, according to the Bristol Airport Co.

E. A. LONG has been appointed field manager for Western Air Express at Albuquerque. W. LANG FRANKLIN is assistant traffic agent.

LIEUT. STANLEY M. UMSTEAD, Air Corps, test pilot for the Guggenheim Fund for the Promotion of Aviation, has received orders transferring him from Mitchel Field to Bolling Field.

New Firms Announced

AEROPHOTO CORP., Salt Lake City, Utah; president, S. F. Robertson; to engage in aerial photography, exploration, transportation and the making of geological maps to aid mine development and research.

SKY SPA CO., INC., 21 City Hall, Saratoga Springs, N. Y.; capital $50,000; by Jerome V. Pitney, Helen F. Pitney, and Helen Gray Cavanaugh; to operate an airport.

Representatives Named

AMERICAN EAGLE — Clarence A. Trump, Tulsa, Okla.

BARLING NB-3 — North Texas College, Inc., Dallas; for the state of Texas.

CARDINAL — Midwest Air Transport Co., Madison, Wis.; for Wisconsin and Minnesota. Aero Agents Co., Inc.; for Illinois, which has appointed H. Donald Meyer as dealer in Evanston, Ill.

EVANS ALL-STEEL GLIDER—Mid-West Airways Corp., Aurora, Ill.; for Illinois.

KARI-KEEN MONOPLANE—The Auto Trunk Co., Kansas City, Kan.

MONOCOUPE — West America Air Schools, Oakland; for northern California.

PARKS AIR COLLEGE—L. H. Ottofy, exclusive dealer for aviation courses in St. Louis metropolitan area.

WACO—West America Air Schools, Oakland; for northern California.

AERONAUTICAL CALENDAR

May 27-30	All-New England Air Tour, starting from Springfield Airport, Springfield, Mass.
June 28	Annual R.A.F. Display, Hendon, Eng.
	EXPOSITIONS
Mar. 22-29	Second Annual Aviation Exposition, Buffalo, N. Y.
Mar. 26-Apr. 1	Cincinnati Aircraft Show, Music Hall, Cincinnati, Ohio, Headquarters, Hotel Sinton.
April 5-12	All-American Aircraft Show, Detroit.
April 18-26	Tri-State, Aircraft Show, Convention Hall, Camden, N. J. L. D. Odhner, executive secretary, Hotel Walt Whitman Annex.
April 19-26	Aircraft Exhibition under auspices of Montreal Light Aeroplane Club, at The Stadium, Montreal, Canada.
May 3-10	New York Aircraft Salon, auspices Metropolitan New York Division, Distributor-Dealers Section, Aeronautical Chamber of Commerce, at Madison Square Garden, New York City.
June 28-July 6	Pacific Coast Aeronautical Exposition, Oakland, Calif., Municipal Airport.
July 6	International Transportation Exposition, Warsaw, Poland.
	MEETINGS AND CONFERENCES
May 5	A.S.M.E. conference on economy of maintenance and operation, New York, N.Y.
May 14-16	National Conference, Airport Section, Aeronautical Chamber of Commerce, Buffalo, N. Y.
May 19-22	Fourth Annual Technical Aeronautics Meeting, A.S.M.E., Wright Field Dayton, Ohio.
July 3-5	Western States Aeronautical Conference, Medford, Ore.
	AIRPORT DEDICATIONS
April 19	New Bedford-Fairhaven Airport, dedication and meet. New Bedford, Mass
May 27	Turners Falls-Greenfield, Mass.
May 30-June 1	Dedication and Air Circus, Colusa, Calif., Municipal Airport.
May 30-June 1	Dedication and Air Meet, Bowles Airport, Springfield, Mass.

AIRPORTS AND AIRLINES

Steering Committee Backs Watres Mail Bill

WASHINGTON (D. C.)—At a conference held Saturday, March 15, of the steering committee of the House, support was promised the Watres air mail bill. With the backing of this committee the bill should receive the prompt attention of the House. Although it has lain in sub-committee some weeks it is now hoped that it will be reported out of the full committee, and have passed the House by the end of March. Speaker of the House Nicholas Longworth, majority floor leader John Q. Tilson, Representative Archie D. Sanders, chairman of the Post Office and Post Roads committee, and Representative Laurence H. Watres, head of the sub-committee and father of the bill are believed to have attended the meeting.

Although a good deal of propaganda subversive to the bill has been circulated around the House its proponents believe that, with the support of the steering committee, its passage is assured. The only provision of the bill which may suffer any substantial change, it is felt, is that allowing the Postmaster General to contract by negotiation rather than by advertisement solely. More opposition is expected in the Senate than in the House. Objection to the bill will probably arise in the Senate Post Office and Post Roads committee, of which Senators McKellar and Bratton are members. In a letter to Representative Watres, Assistant Secretary Clarence M. Young expressed his belief that the proposed amendment is fundamentally sound.

Airway Extension Progress Reported

WASHINGTON (D. C.)—All survey work on the air mail line from New York to St. Louis has been completed. The section from St. Louis to Indianapolis was completed March 10. The survey of the section between Columbus and Philadelphia was completed several weeks ago. No survey is needed between Philadelphia and New York, and Columbus and Indianapolis. Following certification of the surveys the government will advertise for bids for erection of the lights from Philadelphia to St. Louis. This work is expected to start by the middle of the summer.

Bids for the lighting of the Norfolk-Washington section of the new Norfolk-Washington-Pittsburgh-Cleveland airway will be opened in the Airways Division of the Aeronautics Branch March 31, according to Capt. F. C. Hingsburg, chief engineer of the division.

Continental to Carry Express

LOS ANGELES (CALIF.)— Continental Air Express Lines, of this city, which has operated a passenger line between Los Angeles and San Francisco since June, 1929, has announced plans for the inauguration of a freight and express service to be opened between these two centers. The projected express line will use the commercial Sunbeam biplane manufactured by the Commercial Aircraft Corp., of Van Nuys, which was recently taken over by Continental Air Express interests. These planes are powered with the Wright J-6-9. Announcement of the inauguration date will be made pending arrangements with local delivery companies for the pick-up and delivery of express.

Young Announces Air Transport Study

WASHINGTON (D. C.) — A recent study by the Aeronautics Branch of air transport developments since the Air Commerce Act of 1926 has been announced. The report follows, in part:

In 1926 about 5,782 persons were carried on the scheduled routes than operating, while in 1929, the estimated number was 150,000. Mail poundage from 810,855 lb. in 1926 to 7,700,000 lb. in 1929, while mileage flown by mail planes increased from 4,240,407 mi. in 1926 to about 16,000,000 mi. in 1929.

The number of air transport operators increased from 18 in 1926 to 35 in 1929.

On Dec. 31, 1926, there were 8,404 mi. of airways operated by the air transport companies, of which 8,039 were for mail. On Dec. 31, 1929, there were 36,000 mi. of airways in operation, of which 26,597 mi. were used for mail. The mileage actually flown by the operators increased 409 per cent or from 4,315,087 in 1926, with a daily average of 11,830 m., to 22,000,000 mi. in 1929 or 60,273 mi. average daily. At the present time the daily scheduled mileage is about 90,000.

Planes and personnel engaged in the operation of scheduled air transport activities increased from 128 planes, 127 pilots and 355 other personnel in 1927, to 525 planes, 500 pilots and 1,500 personnel in 1929.

A portion of the foregoing data on operations and equipment must be credited to air lines owned by United States companies which extend into foreign countries in the Western Hemisphere. Of the 36,000 mi. of airways operated during 1929, 11,456 mi. were to Canada, Central and South America and the West Indies. Over these 11,456 mi. of international airways, six United States air transport companies maintained fourteen routes, carried 670,000 lb. of mail and flew about 2,000,000 mi. during 1929.

Development of the inter-American services has been satisfactory when compared with the 185 mi. of airways operated from the United States during 1926 over which 55,839 lb. of mail were carried and 34,266 mi. were flown by two operators. Comparable passenger, pilot and equipment statistics are not available due to the lack of sufficient reports.

The study shows that scheduled air transportation constitutes only 15 per cent of all civil and commercial flying activities in the United States. Studies covering the remaining 85 per cent—miscellaneous operations, which include student instruction, air taxi operations, aerial photography, crop dusting, experimental flying and private flying—will be announced later.

St. Louis Runway Experiment Successful

ST. LOUIS (MO.)—Four runways to be built at the St. Louis Municipal Airport as part of the three-year development program recently adopted will be constructed of a mixture of asphalt, earth and crushed rock. The combination is similar to materials used in an experimental runway built last summer, which has shown no signs of deterioration.

The St. Louis experiment has been watched with interest by experts throughout the country. The experimental runway, constructed solely to determine how combinations of earth, crushed rock and asphalt stood up under usage and varying weather conditions, was laid last August at a cost of $12,000. It is 1,400 ft. long, or half the length of proposed new runways. The big test came during a warm period in February when the frost left the ground. The runway held up satisfactorily under this condition.

It has been learned that earth and asphalt might be placed in even better combination, and this knowledge will be employed in laying the new runways. It is estimated that approximately 10 per cent of asphalt will be mixed with 90 per cent of earth. A small amount of crushed rock will be added to prevent the earth from lumping. The foundation will be of natural earth, thoroughly drained. Work on two of the three runways provided for in the program will begin in May or June and six weeks will be required for completion. Drainage work will begin early this spring.

Of the $2,000,000 provided by bond issue more than a year ago, St. Louis has thus far appropriated $1,165,908.32 for development of the airport. In addition to the sum already appropriated, the Municipal Airport Commission recently has authorized further expenditure of $530,000 during the next three years for the construction of runways. taxi strips, drainage, hangars, parking facilities and roads at the airport.

To Open Shuttle Experiment

NASHVILLE (TENN.)—The establishment of a shuttle mail service between Nashville and Atlanta will be opened, as an experiment, on April 1. This new service will allow Nashville's afternoon mail to make connection with the night mail service from Atlanta to New York, so that it will arrive for the following morning delivery. Should there prove to be an insufficient quantity of mail to justify the service, it will be discontinued.

AIRPORT CONSTRUCTION PROJECTS

Central

WORK OF FILLING the ditch resulting from the diversion of Cold Water Creek and leveling the terrain on the east side of the St. Louis Municipal Airport will be completed about mid-April. As soon as the leveling is completed, grass seed will be sown and the area put in shape for landings and takeoffs. Improvements completed at the airport recently include the brick garage and comfort station. With a view to increasing the night landing facilities, a test of five different types of flood lights is now being made. The four flood lights in use at present have been declared insufficient by advisers of the airport commission.

It has been decided to place the administration building and hangar at the northeast corner of the Indianapolis Municipal Airport. Work is about to begin on the buildings, which are to cost $115,000. Bids will be asked shortly for the construction of runways.

Work on erection of the new H. H. Timken hangar, McKinley Airport, Canton, Ohio, has been started by the Melbourne Construction Co. The hangar will cost $10,000, and will house a Ford transport.

South

Miami has entered negotiations with the Pan American Airways, Inc. and the New York, Rio & Buenos Aires Line to lease Dinner Key as a seaplane harbor. Present plans are that each company will have an opportunity to lease 40 per cent of the waterfront property on the northeast and east side of the key, and the city will reserve 20 per cent in the center and the entire south side for private planes.

A tract of 800 acres 6 mi. southeast of Houston, has been acquired by a syndicate formed to promote the project and will be developed as an airport to be known as the Metropolitan Air Terminal. Only half the tract is to be utilized at present. The field will be suited to all-direction landing, and will have one major runway in the direction of the prevailing wind, 4,000x500 ft.

Approximately 250 acres have been leased for 10 yr. by the city of Lexington, Ky., to be used as an airport. The city will pay a rental of $20 an acre and holds the option to buy the land at $500 an acre at the expiration of the lease. Certain exclusive rights have been granted to Lexington Airways, Inc., in consideration of the construction of a hangar and conditioning of the field.

About $250,000 in bonds of the $500,000 voted for the Fort Worth Municipal Airport will be offered for sale in May to pay for the contemplated improvements and to finance the purchase of land now under lease, which constitutes the greater part of the port. It is planned to build a garage, fence the field, and construct an administration building which will include a restaurant.

The old St. Johns River shipyard tract, Jacksonville, Fla., is being graded and put into condition to be used as a temporary landing field. Meantime, the city council has authorized the employment of an engineer of the Curtiss-Wright Airport Corp. to survey the site to determine its suitability for a permanent combined sea and land plane base.

Work is about to begin on the Birmingham (Ala.) Municipal Airport for which $1,000,000 in bonds has been voted. The 300-acre tract lies northeast of the city, less than 5 mi. from the post office. It will be an all-way field, with runways up to 6,600 ft. in length. Plans include night lighting equipment, an administration building in Southern Colonial style, and a municipal hangar, 150x170 ft.

Daytona Beach, Fla., has purchased 200 acres within 3 mi. from the center of the city to be used as an air mail port. Work has already begun on ground improvements, and the contract for purchase of lighting equipment at $3,550 has been awarded the General Electric Co.

Work on the projected municipal airport at Galveston will begin soon. The 1929-30 city budget provides for a tax levy which will bring in a revenue of approximately $43,000 annually to be devoted to the purchase, maintenance, and improvement of the port.

The contract for a $4,000 addition to the main hangar at the Garland Airport, Tulsa, has been awarded to the Braden Steel Corp. The new wing will house the Garland flying schools, and will consist of two floors, 93x20 ft.

The new hangar at Arlington (Tex.) Airport is now in use, offices of the company having been installed in the building and seven planes having moved from Love Field to the hangar. The formal opening of the airport will take place sometime in March.

A 90x100 ft. wing will be added to the Southern Air Transport hangar at Love Field, Dallas.

Work is being pushed on the Hopewell (Va.) Airport so that it will be ready for operation on April 1.

West

A new system of fire alarm boxes at Oakland (Calif.) Airport has been approved by the Board of Port Commissioners. It will consist of 16 boxes and eight alarm gongs, placed at strategic points about the buildings and hangars. All alarms will be registered on control panels in the airport superintendent's office and in the dispatching station of the city fire department.

A $75,000 hangar is to be built at Alameda Airport by the Curtiss-Wright Airports Corp. The new hangar, which will be headquarters of the Curtiss Flying Service, will be of structural steel design, will be 120x108 ft. in size, and will include, besides storage space, general offices, a waiting room, pilots' and mechanics' quarters and shops.

Installation of lights and runway improvement at the new Burley (Ida.) Municipal Airport is reported to be proceeding rapidly. There are to be three runways, each more than 2,000 ft. long.

National Air Freight Line Planned in Calif.

LOS ANGELES (CALIF.)—Plans for the inauguration of a nation-wide aerial freight service have been announced by the Aircraft Finance Corporation of America, of this city, coincidentally with the filing of incorporation papers for the company, to be known as the United States Aerial Express Lines, Ltd. This is the first entry of the Aircraft Finance Corp. into other than purely financing ventures of concerns in which it had no direct interest.

The plan is to operate three transcontinental routes between Los Angeles and Florida, San Francisco and New York, Seattle and Boston, and two coastal services connecting the above named cities along the East and West Coasts. The company plans to operate its own collection organizations and terminals for the handling of freight, and will cooperate with established railway and bus lines for additional feeder service. Schedules call for 24-hr. service between Los Angeles and Chicago, 36-hr. service between Los Angeles and New York, with like schedules prevailing between other points. Among commodities to be handled are included all goods of a precious, or luxurious nature, or goods upon which time in transit is at a premium, such as jewels, orchids, violets, baby chicks, stocks and bonds, style merchandise, and many other such articles.

Actual service is to be started by the middle of 1931 using standard multi-engined planes such as are now being produced. Future equipment used on these lines will be built by the company in a Los Angeles plant and will be designed specifically for freight carrying. These planes are to be of from five- to seven-ton capacity, will have refrigerating and heating systems, and will be powered with Deisel engines. This equipment is being designed under the direction of Charles F. Willard, chief engineer for the Aircraft Finance Corporation of America. Among sponsors of the aerial freight lines are: A. O. Hunsaker, O. K. Hunsaker, Carroll Post, Robert Bowman, Sim Crabill, Carl Wredin, and others.

Nyrba Announces Co-operation

NEW YORK (N.Y.) — Co-operative operating agreements have been arranged between New York, Rio & Buenos Aires Line and the Chilean National Air Line and Aero Lloyd Boliviana, it has been announced. This agreement provides for the exchange of passengers, express and certain classes of mail. The Chilean company operates over about 1,700 mi. and Aero Lloyd about 2,000 mi. Nyrba is operating planes between Miami and Santiago, Chile, via Rio de Janeiro and Buenos Aires. Planes leave Miami for South America each Wednesday and leave Santiago each Tuesday for this country.

Michigan Provides Permits For Airports

LANSING (MICH.)—Airport permits have been issued to the following commercial landing fields in Michigan by the newly created Michigan Board of Aeronautics whose rules and regulations, governing airports, aviation schools, flying instructors, etc., became effective March 1:

Kalamazoo Municipal; Ford; Detroit municipal; Szekely, Holland; Ransom Field, Traverse City; Sharrar, Alma; Triangle Field, Plymouth; Luce County, Newberry; Schoolcraft County, Manistique; Detroit Air Taxi; Ypsilanti; Grand Rapids; Ann Arbor Municipal; Pontiac Municipal; Wing Airport, St. Ignace.

Blaney; Gratiot, Detroit; Menominee County; Kellogg, Battle Creek; Wayne County; Sturgis; Grand Haven; Sault Ste. Marie; Algier County, Munising; Clements, Bay City; Mathewson, Detroit; Junior Board of Commerce Field, Saginaw; Iron Mountain; Emmet County, Petoskey; National Airways, Detroit.

Grosse Ile; Muskegon County; Gogebic County, Bessemer; Ontonogan County; Reynolds Field, Jackson; Wakefield; Ishpeming City; Crystal Falls; Haggerty Field, Detroit; South Haven; Owosso; Saunders, Cadillac; Niles; Gladwin; Harbor Beach; Manistee; Monroe; Michicago, Benton Harbor; Maycock, Detroit; Escanaba; East Lansing; Newago County, Whitecloud; Capital City, Lansing; Charlevoix; Big Rapids; Burns, Detroit; Hammond Airport, Owosso.

The airport license permit allows the operator, under the new Michigan law, to fly passengers for hire and reward. The new Michigan rules dealing with airports are based after the federal regulations. Some legal complications have developed in the enforcement of the new Michigan act.

Eckener to Study Baltimore

BALTIMORE (MD.)—Mayor William F. Broening, of Baltimore, has received a letter from Dr. Hugo Eckener, reading in part as follows: "I want to tell you that I intend to study the environs of Baltimore with regard to the possibility of establishing there an airship harbor for a transatlantic airship service, on a day early in April."

United Airports of Conn. Formed

HARTFORD (CONN.)—United Airports of Connecticut, Inc., has been formed to develop and operate the airport adjoining the Pratt & Whitney and Chance Vought plants at East Hartford, it has been announced. Work on the airport is to be started this summer. The organization is a subsidiary of United Aircraft & Transport Co. Don L. Brown has been elected president.

Air Corps Training Center Taking Shape

SAN ANTONIO (TEX.) — Randolph Field, destined to become the headquarters of the Air Corps flying schools, offers a new departure in flying field construction with all buildings located in the center of the airport and with sufficient ground to provide a field approximately 3,000 ft. wide and 2 mi. in length on each side of the building area.

The layout of the field was approved after careful study of the problems that have confronted the Army schools at Kelly and Brooks Fields in regard to taking off or landing directly over the hangars and other buildings on the airport. It never will be necessary for planes to take off or land over the building area of Randolph Field no matter in what direction the wind may blow.

Randolph Field is located 15 mi. from San Antonio and was donated to the War Department by the city. The field is located on a level tract of approximately 2,300 acres of land. The building area covers about 400 acres and will be occupied by 512 buildings. The cost of the new field will exceed $10,000,000.

Construction of six barracks and two warehouses is now in progress, but work on other structures has been delayed by the fact that bids on plans submitted by the quartermaster general of the army have exceeded the appropriations.

Domestic Air Mail Increases in February

WASHINGTON (D. C.) — Volume of air mail over the domestic routes increased last month over January. The increase amounted to 49,243 lb., making a total poundage for February of 555,176. The daily average for February was 19,827 lb. as compared with the daily average of 16,320 lb. for January. This improvement was in spite of the shorter month. In February of last year 434,260 lb. were transported. The preliminary report of the Post Office Department is as follows:

	Mi.	1929 Dec.	1930 Jan.	1930 Feb.
Boston-New York.	192	9,280	7,391	11,399
Chicago-St. Louis.	278	3,455	3,618	4,249
Chicago-Dallas....	1,059	27,438	24,914	29,356
Salt Lake-Los Ang	600	84,442	61,268	63,811
Salt Lake-Pasco...	530	25,445	18,117	18,672
Seattle-Los Ang...	1,141	23,526	18,484	18,753
Chicago-Minn.....	503	15,042	14,199	13,434
Cleveland-Pitts...	123	9,074	3,333	5,948
Cheyenne-Pueblo..	199	8,455	5,512	5,929
Cleveland-Louis'..	345	4,048	4,286	4,613
New York-Chicago	718	113,858	109,311	119,740
Chicago-San Fran.	1,932	173,945	127,074	136,930
New York-Atlanta	763	28,151	27,141	31,126
Albany-Cleveland.	416	6,628	4,971	4,709
Dallas-Galveston..	320	3,323	2,195	2,876
Dallas-Brownsville	529	7,760	6,626	7,360
Atlanta-New Orl'..	483	6,854	6,889	7,493
Chicago-Cincinnati	270	4,680	4,117	4,553
Atlanta-Miami....	736	13,181	11,440	15,349
Great Falls-Salt L.	489	5,994	5,283	4,644
Chicago-Bay City.	712	6,987	10,893	11,354
St. Louis-Omaha..	403	13,338	10,549	11,420
New Orl's-Huston.	319	4,083	4,063	3,934
Chicago-Atlanta...	768	7,639	6,987	7,656
Pasco-Seattle.....	449	12,134	7,272	9,868
Total.....	....	618,809	505,933	555,176

Increase—49,243 lb.
Daily average—19,827 lb. for February.

Colonial Capital Line in April

BOSTON (MASS.)—April 15 has been tentatively set as the date for opening of the new Colonial passenger service between Boston and Washington, D. C. At the same time Colonial may start four daily flights to New York, instead of three as at present. The Washington trips probably will be twice daily.

Showing the ground preparations already made for the new Air Corps training center now under construction in Texas.

Airport Zoning Group Announced by Young

WASHINGTON (D. C.) — Zoning ordinances to protect the immediate vicinity of airports from the hazard of obstructions which may be raised in the future are to be studied by a special committee recently appointed by Assistant Secretary Young. The findings of this committee will be available for all connected with airport work. The committee includes:

Harry H. Blee, chairman; Edward M. Bassett, Advisory Committee on City Planning and Zoning, Department of Commerce; W. M. Bishop, Air Transport Section, Aeronautical Chamber of Commerce; W. Irving Bullard, United States Chamber of Commerce; George B. Ford, Planning Foundation of America; George B. Logan, Committee on Aeronautical Law, American Bar Association; A. Pendleton Taliaferro, Jr., Airport Section, Aeronautics Branch, secretary of the committee; and James S. Taylor, Division of Building and Housing, Bureau of Standards, Department of Commerce.

Canadian 1929 Air Mail Record Reported

WASHINGTON (D. C.)—The Department of Commerce has announced that a total of 430,636 lb. of air mail was carried over the twenty routes operated by Canadian interests in 1929. The Canadian government paid $473,971.34 for this service. The figures by routes are as follows:

Route	Lb.	Payments
Montreal-Toronto	7,724	$97,420.80
Montreal-Albany (Southbound)	20,680	71,387.50
The Pas-Kississing (Superseded by Cranberry Portage and Kississing)	36,338	4,986.70
Quebec-Seven Islands	30,055	21,374.10
Seven Islands-Anticosti	3,623	1,250.00
Mackenzie River service	12,849	13,970.26
Leamington-Pelee Island	24,431	4,016.50
Narrow Lake-Sioux Lookout	83,406	17,540.42
Moncton-Charlottetown	59,712	14,625.07
Moncton-Magdalen Islands	7,444	3,600.00
Saint John-Halifax	2,021	.....
Ottawa-Montreal-Saint John	3,161	.....
Montreal-Detroit	18,401	137,071.85
Toronto-Buffalo	27,909	12,673.00
Montreal-Ottawa	2,801	6,912.50
Montreal-Rimouski	68,672	45,050.14
Bissett-Lac du Bonnet	18,926	6,063.70
Special flights	918	1,680.00
Oskelaneo-Chibougamau	447	102.75
Montreal-Saint John via Quebec and Moncton	1,118	14,246.05
	430,636	$473,971.34

Fire Sweeps Hadley Hangar

NEW BRUNSWICK (N. J.) — More than $200,000 worth of airport and flying equipment was destroyed here early on the morning of March 15 when a fire swept through a hangar at Hadley Field. The entire structure and contents were lost, including four Eastern Air Transport mail planes, an N.A.T. plane fitted with special government experimental instruments, five machines owned by Kenneth Unger and operated commercially, and three privately owned machines. Eastern Air Transport moved to Newark pending reconstruction but N.A.T., whose hangar was not destroyed, continued operations there.

Building Card Pick-Up Device

NORFOLK (VA.)—The pick-up device invented by A. W. Card, of Flushing, N. Y., is being manufactured by the Whaley Aircraft and Engineering Co., Norfolk. The device is a catapult which hurls a mail bag through the air at approximately the same speed as the plane which has picked it up on a hook trailed by a rope. The catapult may be trundled from place to place as necessary. The commercial model will be tried under service conditions on the Colonial mail route between New York and Boston.

Airway Briefs

Southwest Air Fast Express has reduced its rates to 4.6 cents per mile on its Fort Worth-Tulsa-Kansas City line, and has added an afternoon schedule. The company has also inaugurated daily passenger service from Big Spring and Midland, Tex., to connect with the main line at Sweetwater, Tex.

City officials of Eagle Pass, Tex., have asked that the local airport be made a port of entry so that the recently established extension of Transportes Aeros Transcontinentales' line from San Luis Potosi-Torreon to Eagle Pass and San Antonio may continue to stop there. The line is now in a schedule of three trips per week.

International Airways, Inc., has been organized at Brownsville, Tex., with Fain Gillock as president, to operate a Brownsville-Kansas City line.

Delta Air Service, operating between Dallas and Birmingham, Ala., is considering extension of the line to Fort Worth, Tex.

The harbor commission at Milwaukee, Wis., has objected to the use of Maitland Airport on the grounds that it interferes with harbor development.

Dominion Airways, Vancouver, B. C., reports 1,203 hr. flying in their three planes during 1929, of which 120 hr. were in taxi service, 110 in forestry patrol, and 973 in student instruction.

Thompson Aeronautical Corp. will resume Detroit-Cleveland passenger service May 1, with five round trips daily except Sundays and holidays.

The route of the Detroit-Buffalo division of Stout Air Lines has been changed from across the Province of Ontario to the southern shore of Lake Erie via Cleveland Airport.

Income from Cleveland Municipal Airport for Jan.-Feb., 1930, was $4,430. Estimated expenses were $5,770.

An air circus was held at Camden (Ark.) Airport March 9.

William Holland, pilot for Canadian Colonial Airways, set a new record from Albany to New York recently, covering the 142 mi. in 56 min.

City councilmen of Scottsbluff, Neb., voted down a proposition for an $11,500 bond issue to establish an airport.

The Mexican government ban on the T.A.T.-Maddux Los Angeles-Agua Caliente service, said to have been due to a disagreement about taxes, has been removed and the company is authorized to resume operations.

Western Air Express airport and depot at Albuquerque was dedicated March 2. The plant cost more than $85,000.

A new company is being organized in New Orleans to promote a passenger service between that city and Central American points.

Ralph Virden, P.A.T. pilot, recently completed 3,000 hr. of service with the company without so much as a blown tire or scratched wing.

Recently seven Curtiss-Wright Flying Service pilots carried more than 1,500 persons on short flights between 9 a.m. and 8 p.m. on one day at the Grand Central Air Terminal, Los Angeles.

Reinstallation of teletype equipment at Port Columbus will be made in the near future by T.A.T.-Maddux lines. The machines were taken out when operating expenses were reduced following the cut in fares.

The office and equipment of the ticket sales division of T.A.T.-Maddux lines, Port Columbus, will be moved from the first floor of the hangar building to the ticket salesroom on the first floor of the administration building.

Asserting that City Council has disregarded a popular mandate expressed at the polls last November when citizens directed council to issue bonds of $40,000 to purchase and equip a municipal airport, directors of the Chamber of Commerce of Bucyrus, Ohio, unanimously adopted a resolution calling upon council for immediate action.

Southwest Air Fast Express has extended its Tulsa-Sweetwater line to Midland, Tex. The Tulsa-Oklahoma City run has been extended to Fort Worth and Dallas and a second section has been placed in operation between Tulsa and Wichita Falls, Tex.

A 300 per cent increase in traffic over the first 30-day period of the recently reduced air rates has been announced by Halsey Dunwoody, executive vice-president of the Universal Division of American Airways, Inc., operating company of The Aviation Corp.

George D. Ogden, assistant vice-president of Pennsylvania Railroad, gave a lecture on "Co-ordinated Transport" at Rutgers University Feb. 21, devoting considerable attention to the place of airlines.

Daniel Reed, Curtiss-Wright airport engineer, is in Jacksonville conducting a survey of the Palm Park tract now under consideration as an airport and seaplane base site.

The T.A.T.-Maddux lines have placed an order for RCA aircraft beacon receivers with Radiomarine Corp. of America.

Boeing Air Transport is now using only two planes in relay for the San Francisco-Chicago mail service, instead of five.

FOREIGN ACTIVITIES

Japan Lines Backed By Government Favor

TOKYO (JAPAN)—Air Transport is a live subject in this county. The Japanese government is behind a comprehensive plan for establishing airlines for mail, express and passengers to different parts of the island empire. The Japan Air Transport Co. was founded in August, 1928, under the auspices of the Government, with a capital of $5,000,000, one quarter of this amount being paid in. This action followed the Government announcement in March, 1928, that it would subsidize a company over a period of eleven years.

Japan Air Transport Co. built airports at Tachikawa, 15 mi. from Tokyo and serving that city; at Kizugawa which serves Osaka; at Tachiarai, 20 mi. from Fukoka; and at Urusan, Heijo, Sedul and Dairen. All of these airports have well equipped hangars. The company has also purchased 63 planes as follows:

Twelve Fokker transports; twenty Fokker Super-Universals; eight other planes, one being a Mitsubishi (M. C. type) and three Nakashima-Breguet built in Japan. Then there are twenty small planes for air mail service, two Fokker Super-Universal seaplanes and one Dornier-Wal. The airports serving Osaka and Fukoka can accommodate both land and sea planes.

The air routes now in operation are as follows:

Route	Distance Mi.	Time
Tokyo-Osaka	264	2 hr. 30 min.
Osaka-Fukoka	310	3 hr.
Fukoka-Urusan	149	1 hr. 40 min.
Urusan-Seoul	193	2 hr.
Seoul-Heijo	124	1 hr. 20 min.
Heijo-Dairen	248	2 hr. 20 min.

Land planes are being used on these lines.

During the summer of 1930 it is expected that another route will be established; the first leg including the Osaka-Fukoka route now in use, but instead of going north to cross the Yellow Sea to Shanghai. The seaplanes mentioned will be used on this line.

Services Launched in 1929

Air mail was started in the Toyko-Osaka service in April, 1929, and passenger service began in July 15, 1929. Planes leave both cities twice a day, at 9 a.m. and 12 noon, six days a week. The other service consists of one plane a day, each way. The Fokker transports have three Wright Whirlwind engines each. They carry eight passengers and three pilots. One of the Super-Universals is powered with a Jupiter. The distance flown during the period April-November, 1929, was 465,148 mi., with a total of 683 passengers carried. A side line of joy riders at the various airports adds considerably to the revenue received by the transport firm.

Revenues do not as yet show a profit, but the government subsidies have enabled the paying of a 6 per cent dividend to the stockholders and the leaving of a substantial working capital on hand. The business is growing steadily and the revenues are increasing. There are 300 operatives of whom 40 are fully licensed pilots.

Villiers Builds Patrol Seaplane with Wing-Slots

MEUDON (FRANCE)—Ateliers d'Aviation Francois Villiers has built a new model 26 seaplane, intended for patrol duty, with unusual performance characteristics. It is a low-wing, semi-cantilever monoplane with twin floats, powered by a 420 hp. Jupiter engine. The wings are fitted with Handley Page slots along the whole leading edge, made to operate both automatically and by manual control. Construction is of mixed steel and wood, with fabric covering.

Performance figures as given show a low speed of 37 m.p.h. with slots open, and high speed of 109 m.p.h. The ceiling is 19,600 ft., and the cruising range 9 hr. at low speed, or 526 mi. with slots closed. Useful load is 1,055 lb., and the machine is designed to carry two 110-lb. bombs in addition to two machine guns and full radio equipment. An enclosed cabin is provided for pilot and radio operator. Span is 66.7 ft., length 38.8 ft., and height 14.5 ft. The weight loaded is 6,150 lb., and take-off is in 6 sec. with slots open.

Costa Rica Mail Speeded Up

PANAMA CITY (PANAMA)—Air mail service between San Jose, Costa Rica, and the United States and South America became effective recently when a small biplane of Pan American Airways commenced tri-weekly trips between San Jose, the capital, and Puntarenas, a landing field on the West Coast of that country, carrying mail exclusively. This plane connects with the regular planes of the Panama Division that carry mail and passengers to and from the United States three times a week. Due to its altitude and poor landing field the large tri-engined planes find it impossible to come into San Jose but land at the Puntarenas field on the Pacific Coast, where passengers to the States make connections after a short train ride from the capital or the East Coast. Costa Rica has been using the air mail to the United States and South America since the P.A.A. started operations a little over a year ago.

Announce New British Supplementary Estimate

LONDON (ENGLAND)—A supplementary estimate of £760,000 ($3,800,000) for the air services in the year now ending has just been issued by the Stationary Office. This brings the supplementary estimates already announced for this year to £12,946,346 ($64,731,730). Nearly one-third of the additional sum needed by the Air Ministry is accounted for by an anticipated deficiency of £244,000 ($1,220,000) in the contribution from the Indian Government for home effective services, and an underestimate of the cost of technical equipment and works, building and labor.

The rise in the cost of gasoline and oil and a higher consumption than was expected have added about $270,000 to the estimate, and rewards to inventors which were not expected to fall due this year account for a further $450,000. The increased strength of establishments has added $195,000 to the estimate of pay and allowances. There has been a saving of a like amount on civil aviation, of which $65,000 comes from saving in subsidies.

The cost of airplanes, seaplanes, engines and spares is $1,250,000 less than was anticipated; $310,000 has been saved under the head of research and development; $305,000 on mechanical and other transport; and $295,000 on the estimate for airship development.

The Air Services Appropriation Account for the year 1928-29, also just published, shows a total surplus of £158,064 ($790,320). The chief savings were $755,120 on technical and warlike stores, due to the postponed formation of a new flight; $262,920 on the maintenance of barrack equipment, stores and transport; and $249,945 on civil aviation, accounted for chiefly by the delayed start of the London-India air route. Against these there was a deficit of $716,020 on works, buildings, and lands, due to a deduction from the original estimates to allow for probable underspending.

French Exports Show Increase

PARIS (FRANCE)—Exports of French land planes during 1929 had a total value of $8,207,411, as compared with $5,446,190 in 1928. Seaplanes exported last year had a total value of $190,198. The amounts of purchases from the largest buyers, as reported by the U. S. Department of Commerce, were as follows: Jugoslavia, $1,541,000; Belgium-Luxembourg, $104,500; Turkey, $103,000. A small number of planes were imported from England and Holland.

French Firms Build Seven New Designs

PARIS (FRANCE)—Among a number of new French planes under construction or recently completed, the Albert A.20 light mail plane and the Mureaux flying boat have shown particularly interesting performance. The A.20 is a cantilever monoplane with two 70-80 hp. engines (Salmson, Anzani, Walter, Genet) carried in wing nascelles. It will fly on either engine, and its useful load is said to be 928 lb. with gross weight of 2,773 lb. loaded. The Mureaux flying boat was begun by Hydravions Besson, and taken over by Ateliers des Mureaux when the other firm went out of business. It is capable of carrying ten passengers and a crew of three, with three 420 hp. Gnome-Rhone-Jupiter engines mounted over the single wing. Its useful load is 12,150 lb. with gross weight of 23,170 lb., and it has been taken off the water with one engine stopped, carrying 5,220 lb. of ballast.

Other new French planes nearing completion include a Dewoitine D.35 light commercial monoplane for four passengers and pilot, with 230 hp. Hispano-Wright engine; a Villiers monoplane seaplane with slotted wings; a Breguet commercial tri-engined plane; an all-metal Caudron monoplane to carry three 230 hp. Salmson engines; and the Caudron C.230, a touring biplane with folding wings intended for production at an attractive price.

Develop Persian Airways

TEHERAN (PERSIA)—Companies representing five different countries are now operating airlines in or across this country, according to a report by the U. S. Department of Commerce representative. Most of the interior services are operated by the Junkers company, which owns the airports here. Imperial Airways makes stops at Bushire and Jask on the route from Bagdad to Karachi, and K.L.M. planes flying from Amsterdam to Batavia, Java, follow the same route along the Persian gulf. A French company has also requested permission to use it for a line to Saigon, Indochina. A Russian company has a terminal at Pahlavi, in the north. Altogether there are 25 landing fields in Persia.

Luft Hansa Gets Chinese Rights

BERLIN (GERMANY)—Deutsche Luft Hansa announces that its representatives have signed an agreement with the Chinese Minister of Communications under which it is given the right to carry air mail from Germany to China by the northern route. It is understood that Luft Hansa will enter into negotiations with the Russian government for the right to fly across Russia to Irkutsk, probably in co-operation with the Russian service which has already been established between Moscow and Irkutsk.

Plan Around-Italy Tour

ROME (ITALY)—Following the decision that Italian planes will refrain from competition in this year's European Light Plane Tour, an around-Italy tour has been organized. The event will be held in August and the itinerary will include Littorio Airport, Naples, Brindisi, Verona, Piacenza, Parma, Sarzana, Pisa, and Ciena.

Foreign Briefs

Four-day passenger service from New York to Paris, using planes between Queenstown, Ireland, and LeBourget, will be tried this spring.

Latvian Air Force is using five Bristol Bulldog single-seater fighters, and has ordered seven more. Estonia has also ordered twelve of these machines for the Air Force.

Lives of thirteen Polish military aviators have been saved by Irvin Air Chutes during the past two years, and a lieutenant in the Siamese Royal Air Force also recently jumped from a burning plane with an Irvin chute.

Air Vice-Marshall Sir Robert Brooke-Popham, now in command of the Royal Air Force in Iraq, has been appointed Commandant of the Imperial Defence College, succeeding Maj.-Gen. W. H. Bartholomew.

A Compagnie Generale Aeropostale plane recently averaged 109.5 m.p.h. for the 3,000 mi. between Marseilles and Dakar, including all stops.

Louis Breguet has been made chairman of the Societe Francaise de Navigation Aerienne, succeeding the late Auguste Rateau.

Southern Railway, one of the largest British railroads, has acquired a substantial interest in Imperial Airways, and plans to inaugurate new services in cooperation with the latter company.

Maurice Bellonte will accompany Capt. Dieudonne Costes in his attempt to fly from Paris to New York this summer. He is now taking flight training to qualify for a pilot's license.

The Letord factory at Meudon, France, was destroyed by fire recently, together with many valuable designs, and a number of planes.

Mexican Aviation Co. expects to inaugurate a thrice weekly passenger, mail and express service between Vera Cruz and Villahermosa immediately.

Fridtjof Nansen lectured before the Royal Aeronautical Society March 14 on Aims and Objects of the Aeroarctic. Martin Wronsky, of Deutche luft Hansa lectured on Air Transport March 10 before the Royal Aeronautical Society and the Institute of Transport.

Mexican military aviators will make a survey of the dry bed of Lake Texcoco, dust from which is often blown into the city causing much inconvenience and damage.

The R. 38 memorial prize given by the Royal Aeronautical Society was awarded to Miss Hilda M. Lyon, M.A., A.F.R.Ae.S., for 1929, for her paper on The Strength of Transverse Frames of Rigid Airships.

Plans are being made in France to transform the wartime dirigible port at Guipavas to a commercial airport, at a cost of about $33,496. A new airport is to be constructed at Chateau-Bougon, on the proposed Cherbourg-Bordeaux-Spain route.

State goverment of Pernambuco, Brazil, will erect a mooring mast at Juquia Field, near Recife, preparatory to the visit of the Graf Zeppelin this spring.

Partial performance figures recently released credit the British Hawker Hart bomber (Rolls-Royce F engine) with a climb to 6,000 ft. in 5 min., and speed of 176 m.p.h. at that height. Its ratio of gross weight to tare weight is 1.6.

Imperial Airways has been granted a three months' provisional convention for transporting the Indian air mail across Greece, pending a definite agreement. The service will soon operate regularly by way of Belgrade and Athens.

In conjunction with the Brindisi-Constantinople air express, the new Athens-Rodi air service will soon be inaugurated with S.55 flying-boats.

Transadriatica Co. has adopted the well-known Asso 500 aero engines on their Junkers planes.

Wolf Hirth has been awarded the German national trophy for the most outstanding sporting flight of 1929 for his crossing of the Alps in a 40 hp. Klemm last October. Following this crossing he flew to Milan, Rome and Brindisi, in Italy, and then to Marseilles. France. Returning to Germany he crossed the Alps the second time.

An eight-plane ambulance service, available to the natives at the rate of about $0.25 per mile, has been placed in operation in the Sahara by the French military authorities, it has been announced.

Mexico Licenses Civil Pilots

MEXICO CITY (MEXICO)—Three classes of civilian pilots have been established in Mexico under regulations issued by the department of aviation of the Ministry of Communications and Public Works. All these pilots must pass tests in their various classifications ordered by the department. The first class is transport pilot and the holder of such a license must be competent to operate a plane of any kind that carries passengers on any route in Mexico and in the Americas. The second type of license bears the title limited transport pilot and is issued to those who can manage any kind of passenger carrying plane but are only allowed to operate within a limited radius. The third are tourist pilots, allowed to fly planes which do not carry passengers. All civilian pilots must undergo examinations at frequent intervals, under department rules.

Wisdom Beneath The Wings

Zooming upwards the ground is forgotten; but when you nose your ship down for the landing, a feeling of greater confidence will come with the reflection that the landing gear is Timken-Bearing-Equipped.

For you will know that beneath you are wheels of utmost strength; wheels that impacts cannot harm; wheels without side-shake or wabble; wheels that curb ground loop; wheels that make braking smooth and uniform; wheels that will set you down safely on any terrain.

Timken-equipped landing and tail wheels are wisdom's choice for planes of all types and all sizes . . . through the exclusive combination of Timken tapered construction; Timken *POSITIVELY ALIGNED ROLLS* and Timken-made steel.

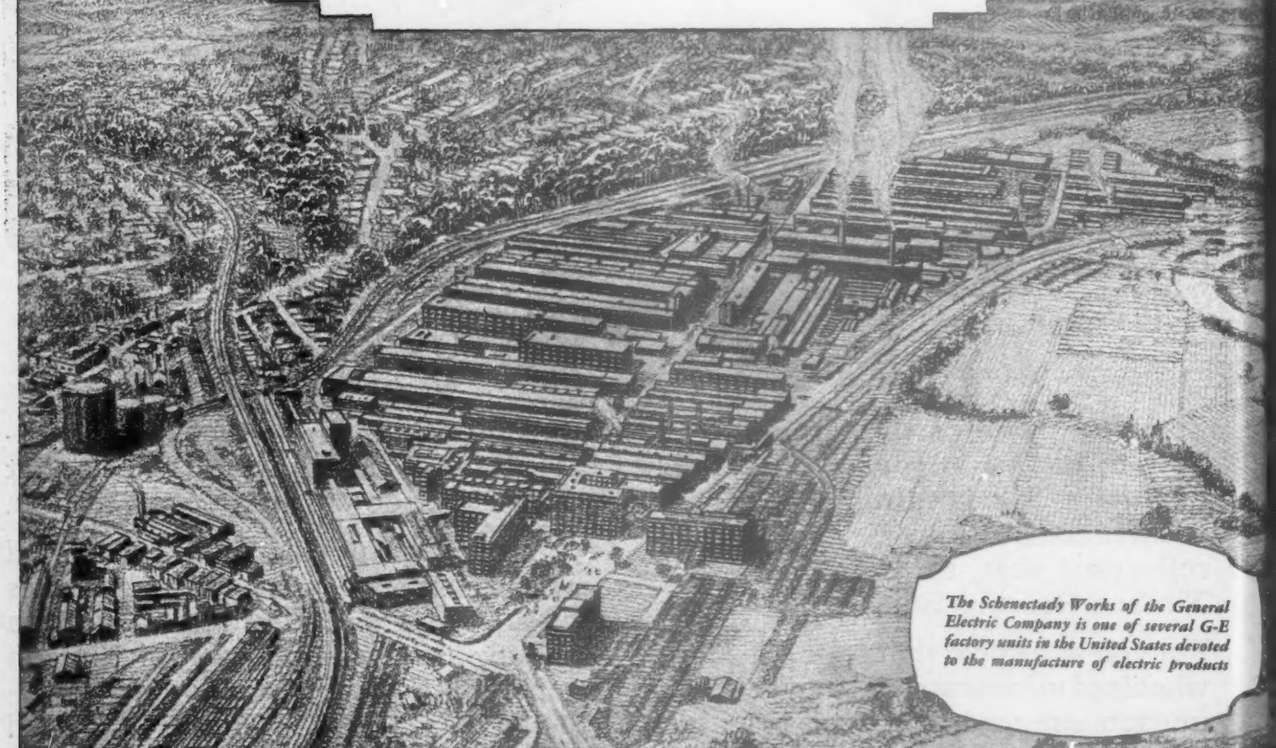
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

The Resources of a GREAT INDUSTRY

TO-DAY, the electrical industry is one of the greatest allies of aëronautics. Every prophecy as to the development of air transportation must include electricity as an important factor not only in its hundreds of applications on the ground but also *in the air.*

The aëronautic industry is now depending upon electricity for radio, instruments for navigation and flight, ignition systems, lighting units, and manufacturing and service equipments. General Electric has developed many of these devices to a degree of remarkable dependability. We invite your interest in these products. Write us.

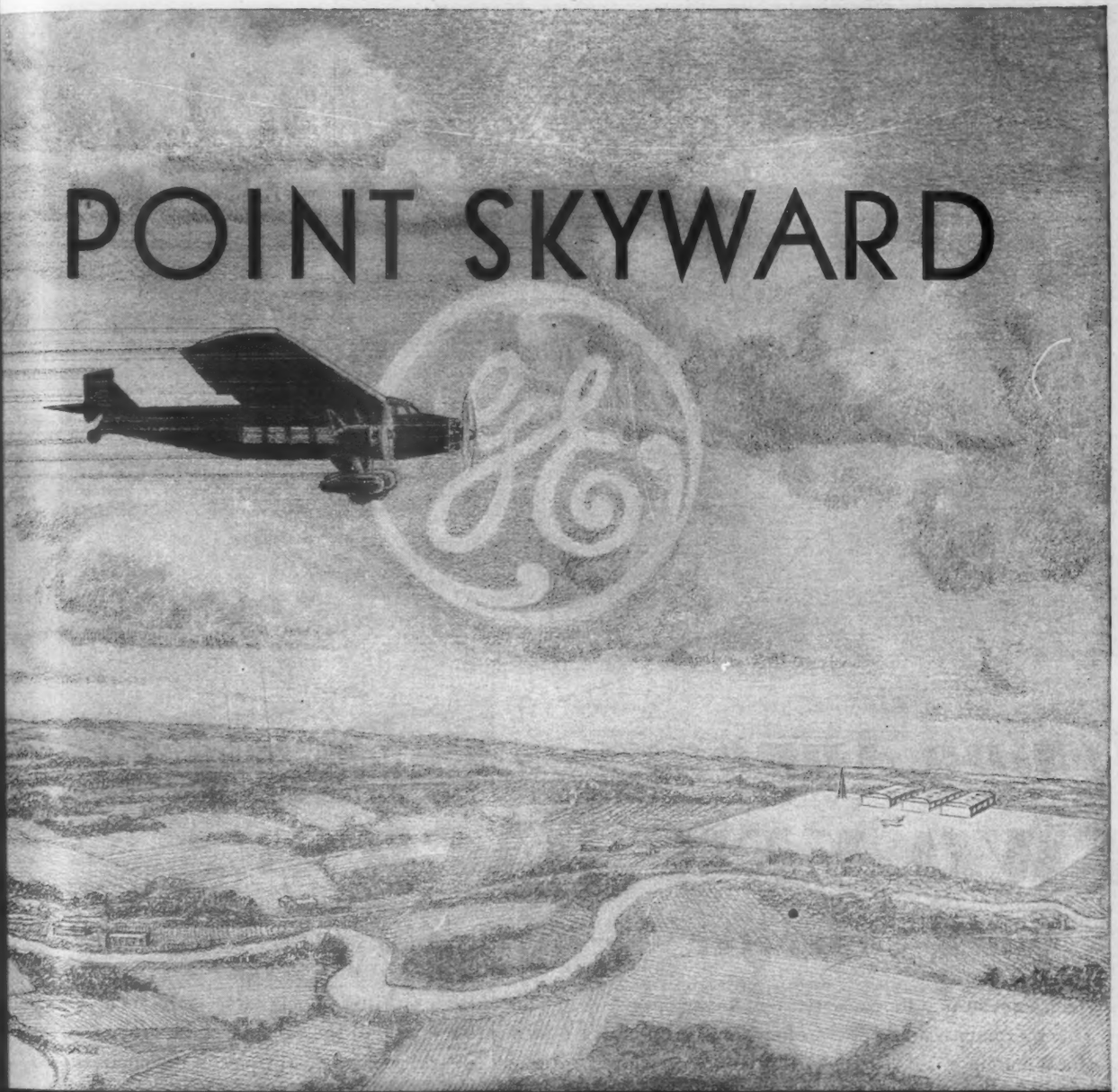


The Schenectady Works of the General Electric Company is one of several G-E factory units in the United States devoted to the manufacture of electric products

GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

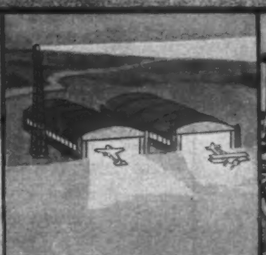
POINT SKYWARD



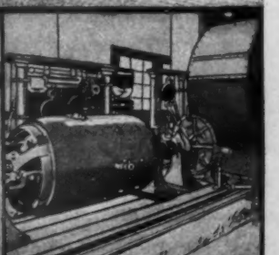
magneto compass is representative eneral Electric instruments for nav- igation and flight

Superchargers, magnetos, ignition cable, and radio-shielding ignition harnesses are among General Electric products

Lighting equipment includes switches, lamps, and wiring supplies for aircraft installation



A majority of the airport-lighting equipment installed in the United States is of General Electric design and manufacture



Dynamometers and motors and control devices for every application are also General Electric products

711-47

ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

To the left:
The passenger may sit in ease and comfort or move about with complete freedom; his Quick-Connector Air Chute instantly available in case of emergency.

Below:
Note the ease and comfort with which the passengers sit in this new Irvin Form-Fitting Pack.

Irving Announces
TWO NEW PACKS

Quick-Connector

Prominent aeronautic authorities state that this new pack is the most important parachute device offered during the past ten years. When equipped with the Quick-Connector type of chute, you wear only a comfortable harness while in flight. The Air Chute is carried separately in a Quick-Connector Pack, always within easy reach. In emergency it is only necessary to grasp the pack and place it against the chest. This pack is already adopted as standard equipment by several governments.

Form-Fitting
(CHAIR-TYPE)

This new Form-Fitting Back Pack can be incorporated into the back of the airplane chair. When thus used, the pack remains at all times in the chair, the harness being conveniently arranged so that passengers merely seat themselves and thrust their arms into the harness. They enjoy all the ease and comfort of a finely upholstered chair, with the added protection of a reliable Irvin Air Chute should emergency arise.

These chutes represent but two of the five different types of Irvin Air Chutes, available in all parts of the country. If there are no dealers near you, write to us for full particulars.

* * * *

Dealers should communicate direct with the company.

IRVIN *The Life Preserver of the AIR*

IRVING AIR CHUTE CO., INC., 372 PEARL STREET, BUFFALO, N. Y.

Our Motion Picture "Happy Landings" on standard width film, illustrating actual operation of the Irvin Air Chute is available free of charge to schools, clubs and organizations interested in aviation. Send for booklet and particulars.

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AIRCRAFT TRAVEL FABRICS

THE demands of aircraft manufacturers and operators are exacting . . . this extends to upholstery and trimming, as well as to other features of construction and decoration. And this is why

CHASE
Velmo
MOHAIR VELVETS

are fulfilling these requirements for the ideal Aircraft Upholstery: (1) Velmo is a lightweight material; (2) it it as near inflammable as any textile; (3) it is colorful, comfortable, and artistic in design; and (4) it is easily and quickly cleaned.

And for Trim and Upholstery of Mechanics' and Pilots' Seats

CHASE
Leatherwove
Made by
SANFORD MILLS, SANFORD MAINE

—a scientifically coated fabric—meets the demand of the experts for a long-wearing, beautifully-grained fabric, in a variety of colors, and eminently suitable for panels, kick-pads, door-trim, etc.

Write for samples

These Chase Aircraft Travel Fabrics Made by SANFORD MILLS

L. C. CHASE & COMPANY, *Selling Agents,* **BOSTON**
NEW YORK · DETROIT · SAN FRANCISCO · CHICAGO

SAFE

on wet and muddy spring fields

SOFT ground holds no threat for planes equipped with Goodyear Airwheels. These great, pillowing wheels and tires combined roll easily over ground far too soft for any other type of equipment—just as they make it possible to come down safely on plowed ground, sand or snow in forced landings.

Goodyear Airwheels operate with 5 to 15 pounds pressure. They spread out with a broad, yielding contact when they meet the ground. They add greater cushion to every landing or take-off; make it possible for planes to get into the air more quickly in rough fields; shorten the stopping distance on landing.

It is almost impossible to drag a wing in a ground loop when planes are equipped with Airwheels. And because there are no wheels, there can be no wheel collapse. Airwheels mount directly on the hubs.

Goodyear builds the complete Airwheel, hub and brake combination. The brakes bring the plane to a stop with a sure, smooth, positive action and with unsurpassed safety.

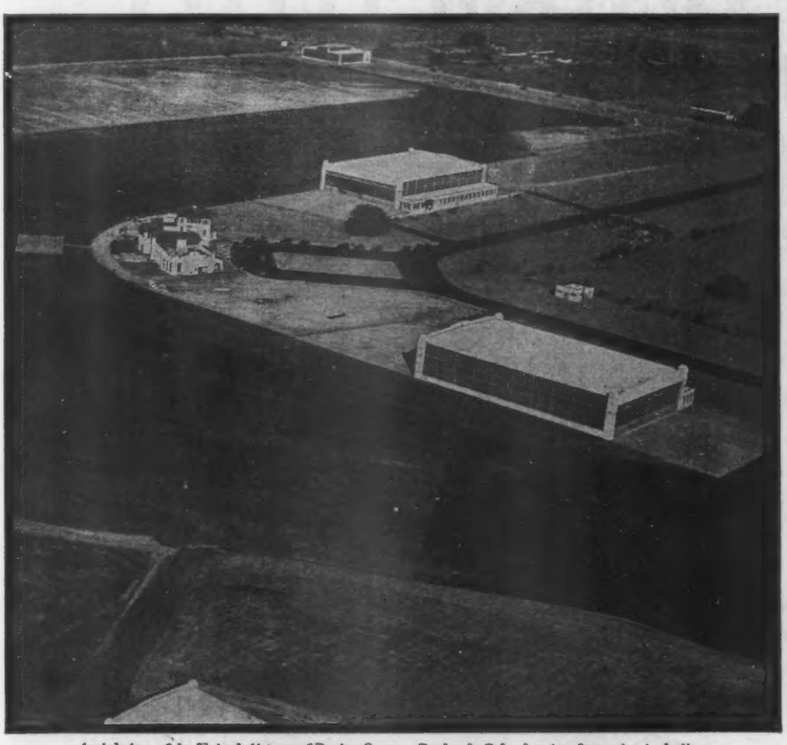
Wind tunnel tests show that the streamline shape of Airwheels reduces wind resistance. Repeated landings with punctured casings show that they are as safe or safer than other types of tires.

For information or engineering assistance, in equipping your future ships, write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.

GOODYEAR

EVERYTHING IN RUBBER FOR THE AIRPLANE

Today's ships are fine...



Aerial view of the United Airport of Boeing System, Burbank, Cal., showing first units, including air depot, hangars and runways completed. Design, construction and equipment by Austin

NOW let's have more REAL PORTS

SHIPS of today are fast, safe and reliable. They are as perfect as present-day research and experience can make them . . . *but can we say as much for the airports where these ships take off and land daily?*

Realizing that development of airports is a mighty factor in the progress of aviation, Austin created an organization of airport engineers and builders which, in the past ten years, has already provided improved facilities in 21 states and 37 cities from Coast to Coast.

Selection of sites and every task up to and including construction of complete airports has been Austin's responsibility, and here, briefly, are the services this nation-wide organization offers:

Airports—Preliminary Surveys and reports—Site Selection.

Complete Engineering, including topographical map; detailed plans and specifications for grading, drainage, lighting, runways and all airport buildings.

Complete Construction—Grading, drainage, lighting, runways, air depot, hangars, shops, flying schools and aeronautical factories.

Hangars, aircraft and accessory manufacturing plants—designed, built and equipped.

Ask for a copy of the helpful booklet "Airports and Aviation Buildings"—3rd Edition—as well as approximate costs and additional information on any project contemplated. Wire, phone, write or use the convenient memo below.

THE AUSTIN COMPANY

Airport Engineers and Builders Cleveland

New York Chicago Philadelphia Newark Detroit Cincinnati Pittsburgh St. Louis Seattle
Portland Phoenix The Austin Company of California Ltd.: Los Angeles, Oakland and San Francisco
The Austin Company of Texas: Dallas The Austin Company of Canada, Limited

Memo to The Austin Company, Cleveland—We are interested in ☐ Airport (Municipal) (Private) containing ..... acres. ☐ Hangar..... x.....
with..... ft. clearance. ☐ Factory approx..... sq. ft. Send copy of "Airports and Aviation Buildings." Name.....
Position..... Firm..... City..... A 3-22-30

THE CONTROL PULLEY AVIATION HAS BEEN WAITING FOR

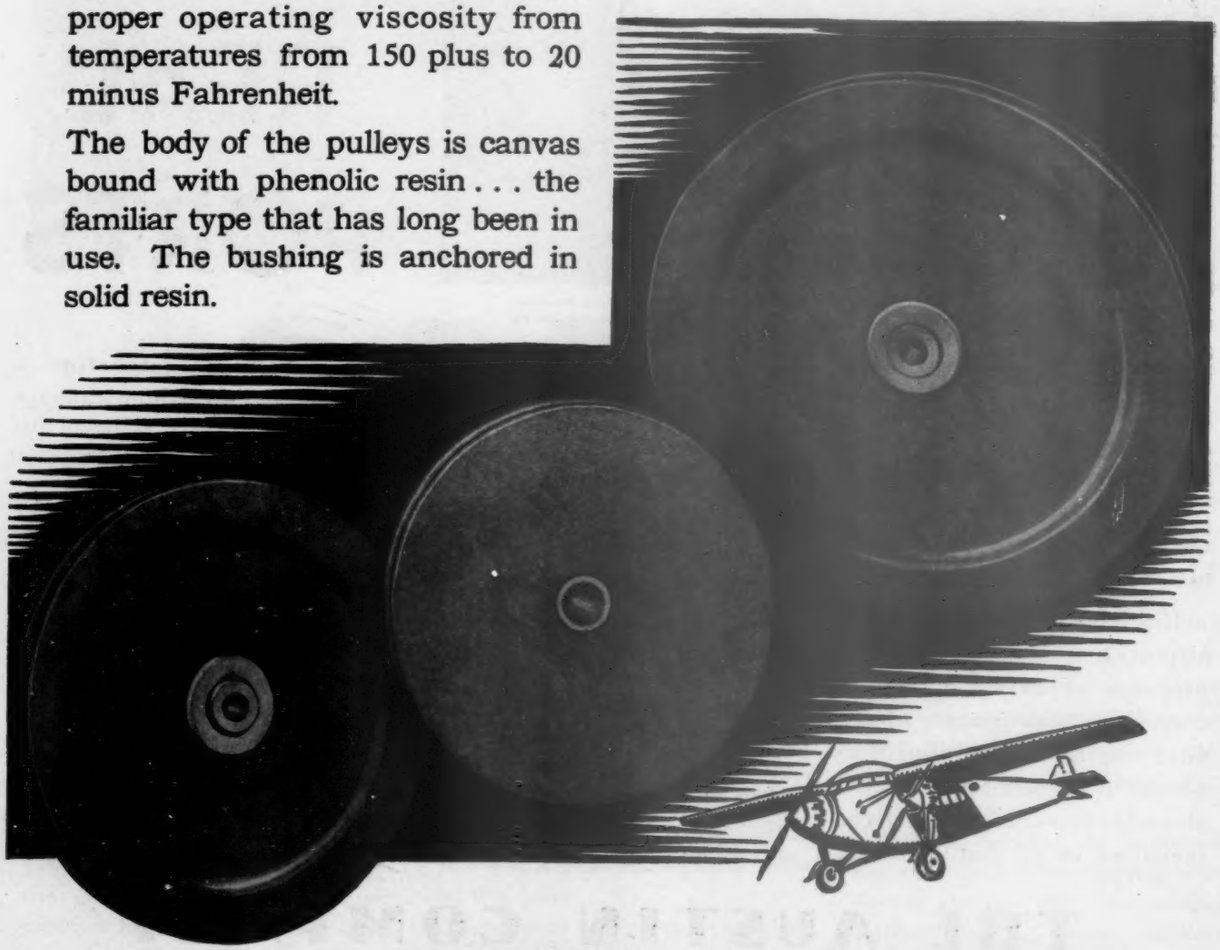
FORMICA is offering a line of ball bearing control pulleys which greatly reduce the friction and make planes much easier to control.

This pulley is equipped with a special Fafnir ballbearing and is lubricated with an oil that will retain a proper operating viscosity from temperatures from 150 plus to 20 minus Fahrenheit.

The body of the pulleys is canvas bound with phenolic resin . . . the familiar type that has long been in use. The bushing is anchored in solid resin.

Where it is desired to avoid lubrication, a line of pulleys with bronze bushings is available of Formica manufacture.

Write for literature and prices



THE FORMICA INSULATION COMPANY
4622 Spring Grove Avenue - - - Cincinnati, Ohio

FORMICA

Travelling in MINUTES *where* HOURS *were once required*

How a Sikorsky Amphibion helps Bror G. Dahlberg to be in Chicago, New York and Florida in one week

•

Photo Fairchild Aerial Surveys

How the Florida country looks from the comfortable cabin of a Sikorsky Amphibion

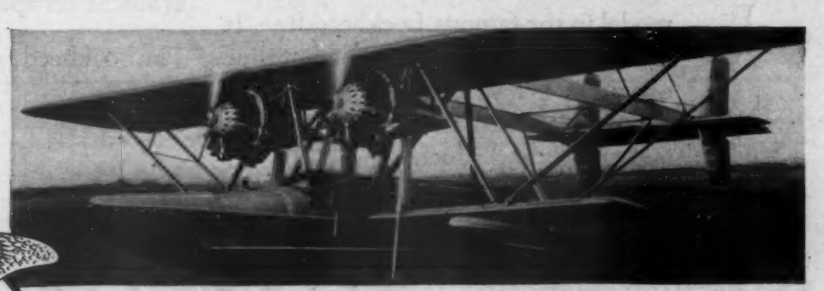
TIME and distance are twin factors that demand the attention of great executives in modern industry. The Celotex Company, for example, has its general offices at Chicago and its factory across the river from New Orleans. In Florida are the plantations and mills of the Southern Sugar Company, and the South Coast Company's properties are located in various parts of Louisiana.

The operation of these companies frequently requires Mr. Bror G. Dahlberg, their founder and executive head, to be in the North, East and South all in the same week. He travels almost entirely by air, using the comfort, speed and adaptability of his Sikorsky Amphibion to save him many invaluable hours each week.

With a full load cruising speed of 110 miles an hour, the "S-38" Amphibion cuts ordinary travel time in half. Yet the ship is so stable and comfortable it gives one the sense of complete relaxation usually associated with a deep leather chair at the club. Two Pratt & Whitney "Wasp" engines of 420 H. P. each provide a wealth of reserve power. The ship can fly and maneuver on either engine.

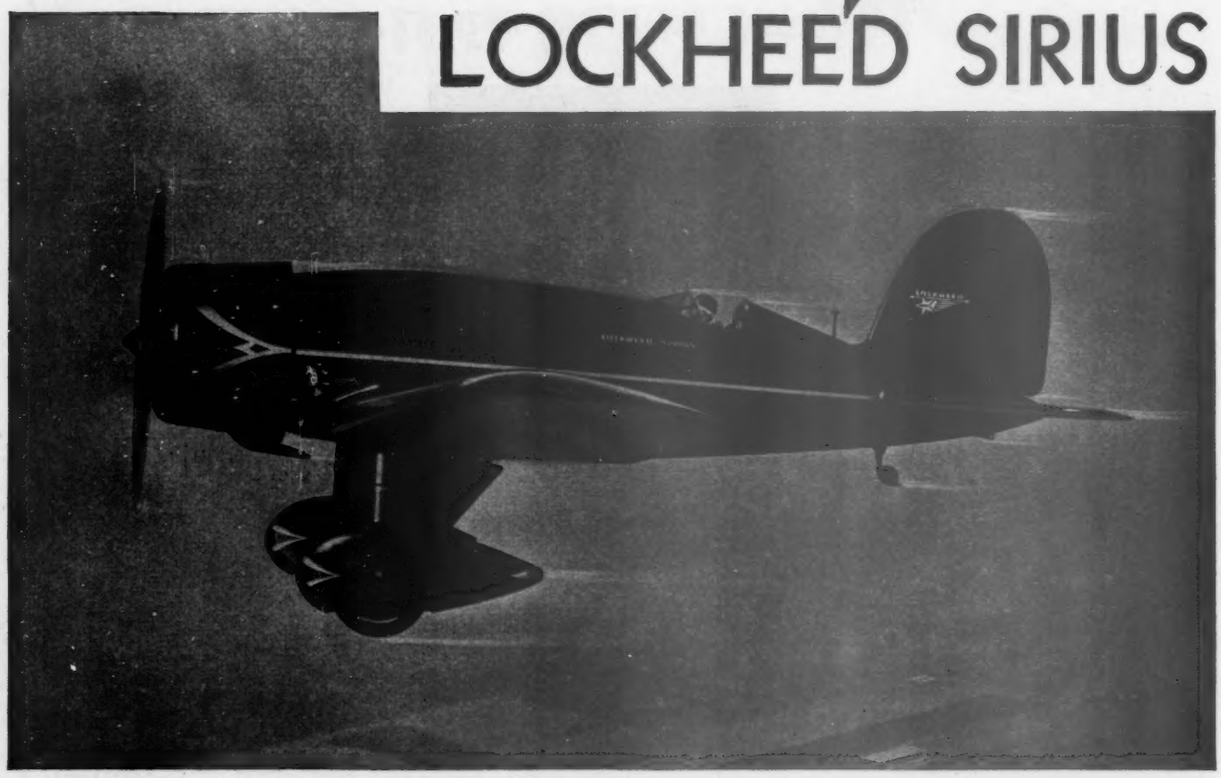
Every bay, harbor and lake is a landing field for the "S-38," and it only requires a touch of a control to drop the wheels and convert her to a splendid landplane. Many executives in business and industry whose wide interests force them to spend many hours a week in travel have found the way to effect a 75% saving in time . . . and double their travel pleasure . . . by using the luxurious Sikorsky Amphibion. An unusually attractive folder has just been issued, describing this ship. May we send you a copy? Sikorsky Aviation Corporation, Bridgeport, Connecticut. Division of United Aircraft & Transport Corporation.

This 10-passenger Sikorsky Amphibion used by Mr. Dahlberg in keeping in touch with his widespread business interests, is powered with two 420 H.P. Pratt & Whitney "Wasp" engines, and can fly and maneuver on either engine



SIKORSKY AMPHIBION

The New LOCKHEED SIRIUS



Low-Wing Mail Ship

Introduced for the first time to the aircraft buying public at the International Aircraft Show, the Lockheed Sirius has been accorded enthusiastic reception. Orders totaling $200,000 were received for this new ship within two weeks after its A.T.C.—No. 300—was issued.

Originally designed for Col. Lindbergh, the Lockheed Sirius is now a standard model in the famous Lockheed line. It offers passenger, mail, and express airline operators a low wing commercial plane that is easy to fly and which has a quick take-off and a surprisingly slow landing speed.

Having the same size fuselage as the Lockheed Vega, the Sirius can be fitted with a four or six place cabin, entered by a door over the wing. For use as a mail or express plane it can be equipped with a large capacity baggage compartment. Other convertible features are available on special order.

The Lockheed Sirius is priced at $18,985. Complete specifications, weights, and performance data will be supplied upon request.

Cruising Speed	*140 m. p. h.*
Landing Speed	*45 m. p. h.*
Climb	*1000 ft. per min.*
Pay Load	*1230 pounds*

LOCKHEED AIRCRAFT CORPORATION
RYAN AIRCRAFT CORPORATION
PARKS AIR COLLEGE, INCORPORATED
PARKS AIRCRAFT CORPORATION
EASTMAN AIRCRAFT CORPORATION
AIRCRAFT DEVELOPMENT CORPORATION

DETROIT AIRCRAFT
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BLACKBURN AIRCRAFT CORPORATION
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CHANIN BLDG., NEW YORK :: ROOSEVELT BLDG., LOS ANGELES

Grosse Ile Airport—Open to Visiting Pilots—Bus Service to Detroit

You can't expect an aircraft engine to perform on a magazine page . . . . but PERFORMANCE in the air is PROOF

Charge to the account of

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Send the following message, subject to the terms on back hereof, which are hereby agreed to

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Buffalo, New York
Oct. 30,1929

rcd Pottstown
by F. Denn
3:00 P.M.

Light Manufacturing & Foundry Co.
(Brownback Motor Laboratories)
Queen Street
Pottstown, Pennsylvania

Reference our delivery to you of our Fleet Training Plane equipped with Brownback Engine we advise that your Engine lived up to expectations in every way. Our pilots advise the Engine starts and idles satisfactorily, accelerates rapidly and at all speeds is noticeably smooth and free from vibration. We congratulate you upon a noteworthy addition to the light Engine class.

FLEET AIRCRAFT INC.

YOU can't power a plane with pretty pictures and many cylinder adjectives. No matter how much we promise of smooth, vibrationless power at lower cost, these promises must be redeemed in the air . . . else we are idly tinkling a cymbal. That is why you will be interested in this telegram which was sent by Fleet Aircraft, Inc., after their installation and test of the TIGER—Brownback C400.

Because of its correct design and sturdy construction the TIGER Aircraft Engine provides 90 horsepower at an extremely low r. p. m.—at a weight of less than THREE POUNDS PER HORSEPOWER. Its amazingly simple design reduces the cost of upkeep and service. A particularly successful engine for training planes.

We will be glad to arrange a demonstration of the TIGER IN THE AIR, or we will send descriptive literature including complete specifications on request. Aeronautical Division, LIGHT MANUFACTURING & FOUNDRY CO., POTTSTOWN, PA.

SMOOTH, VIBRATIONLESS POWER

Brownback C400 **TIGER**

DEPARTMENT OF COMMERCE APPROVED TYPE CERTIFICATE No. 33

FOKKER FACTS—III

THEN CAME THE F-10 TRI-MOTOR

A PROMINENT air line wanted a new type of transport. It set up rigid specifications for greater safety, speed and economy. Few thought that such a phenomenal airplane could be built.

Fokker's answer was the F-10, a 14-place trimotor, which not only met the requirements but went well beyond them. Today, with many improvements, more F-10's are used than any other ship of their capacity in the world.

Powered with three Pratt & Whitney 425 h.p. Wasp engines, the F-10 has a high speed of 140 m.p.h. and a cruising speed of 118 m.p.h. Its range is 6½ hours, 765 miles.

Back of this ship stands Fokker's experience in building more planes than any other manufacturer, Fokker's accomplishment in making twice as many great pioneering flights as any other make of plane, Fokker's record of 25,000,000 miles of dependable travel on American transport lines, and Fokker's affiliation with the vast resources of General Motors Corporation.

Because of economies due to the production principles of General Motors, prices are probably less than you might expect. Convenient terms may now be arranged on the GMAC finance plan.

For the use of business executives, for pleasure, and for transport use, Fokker now makes ten different models of airplanes: single and multi-engined types, land planes, sea planes, flying boats, amphibions. Requests for information or demonstration are invited, and will be promptly answered. Fokker Aircraft Corporation of America, General Motors Building, New York.

FOKKER

AFFILIATED WITH GENERAL MOTORS CORPORATION

There are more Aerol Struts in use today than any other make.

AEROL STRUTS IN HOLLAND.

A SHORT time ago, the following message was received from H. Pander & Zonen of Holland. It is typical of the international recognition accorded Aerol Struts.

"The demonstration on Aerol Struts we gave for the Dutch Government made a big impression and as a result, the Army adopted these struts for use on the Fokker single-seater fighters being built for use in Holland and the Dutch Colonies.

"We are using Aerol Struts as standard equipment on all aircraft of our manufacture and find that they have greatly increased public confidence in our planes and also the confidence of the pilots who fly them.

"The Aerol Tail Wheel Strut gives complete satisfaction. Taxiing is like riding in a motor car and there is no jumping up of the tail after a bad landing.

"The Dutch Aero Club and Dutch National Flying School use Aerol Struts exclusively and are absolutely sold on their value. They feel it to be a fact that many crashes made by pupils previous to their use of Aerol Struts would have been prevented."

This view shows how Aerol Struts are installed between the fuselage and wheels. "A" is the stationary cylinder. "B" is the sliding piston attached to the axle allowing perfect freedom of movement, yet effectively eliminating destructive shock before it reaches the fuselage.

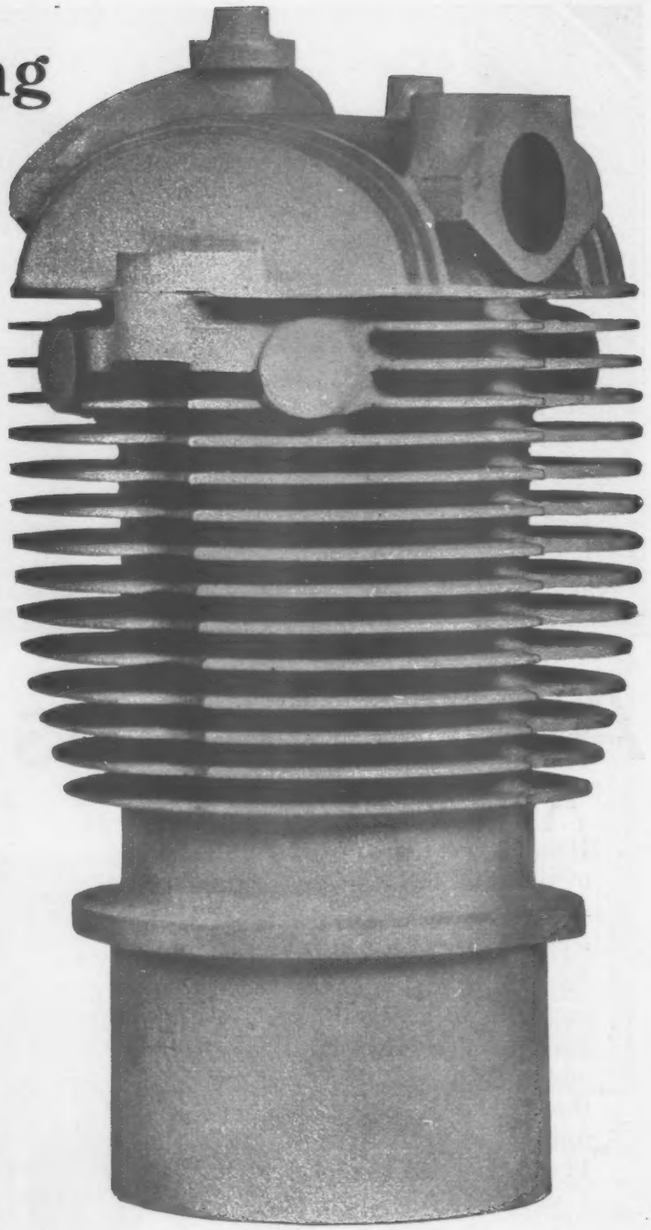
Wherever ships are flown—wherever pilots get together—Aerol Struts are recognized as the finest protection that can be given any plane.

Aerol Struts are manufactured by The Cleveland Pneumatic Tool Company, Cleveland, Ohio. The company also offers a complete line of air-operated hammers, drills and accessories.

AEROL *shock absorbing* STRUT

Improved Wearing Qualities

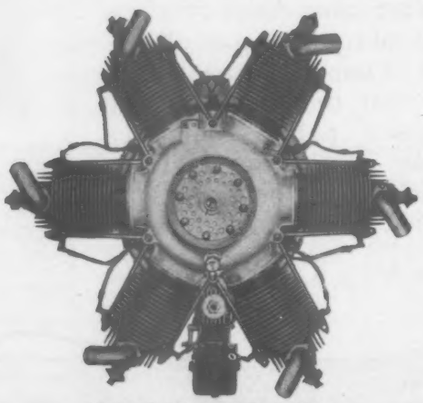
CHENEY-CAST CYLINDERS for BROWNBACK



In the long and thorough research work preceding the development of the remarkable nickel-iron used in Cheney-Cast Cylinders, the prime importance of wear-resisting characteristics was continually emphasized.

The resulting iron, with a uniform distribution of carbon, has exceptional wearing qualities as well as high strength-characteristics.

If you have been thinking of cast cylinders in terms of ordinary gray iron castings, it will pay you to investigate Cheney-Cast Cylinders. They are the result of twenty-five years' experience in making air-cooled cylinders.



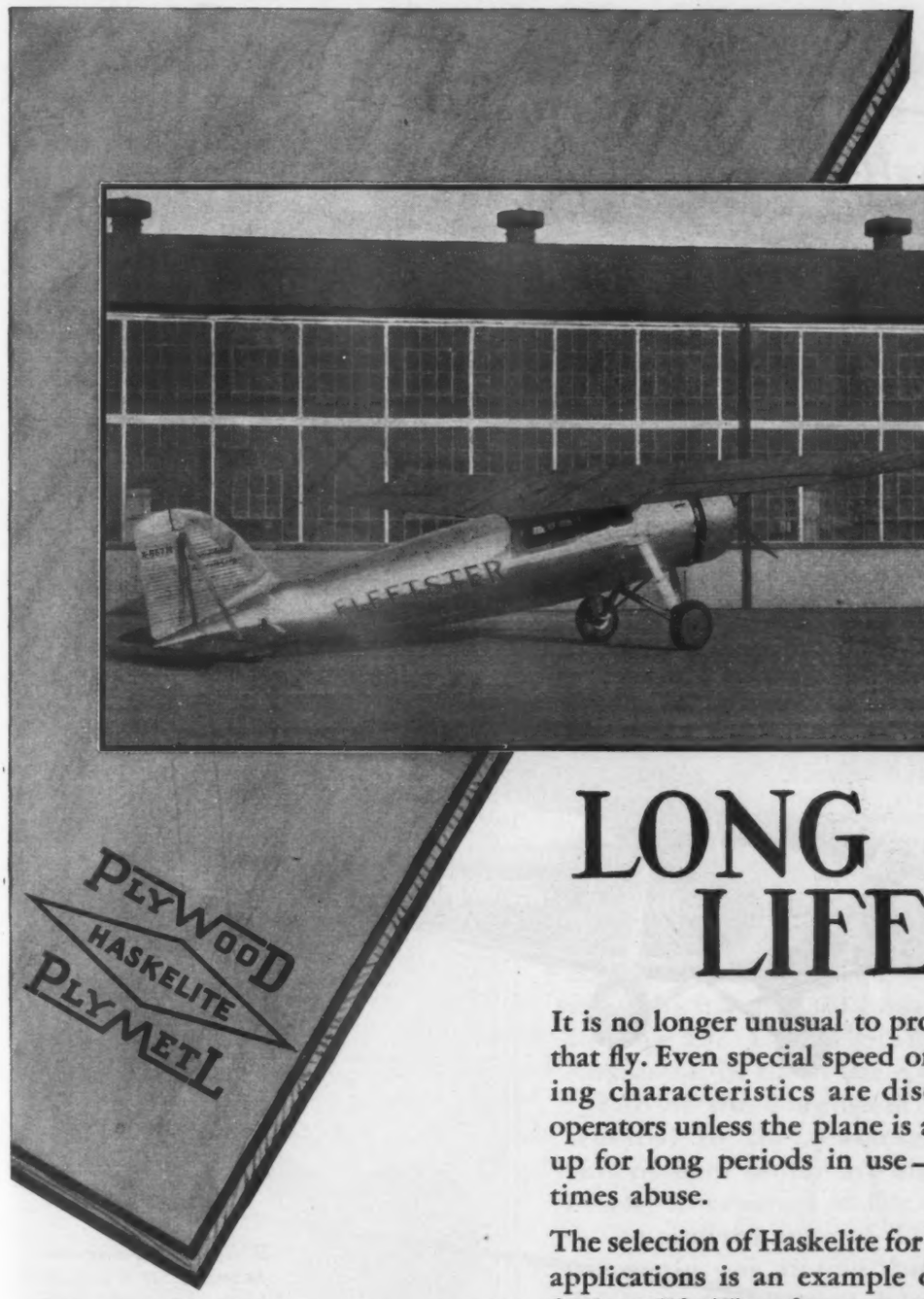
Brownback Model C-400 Motor. Equipped with Cheney-Cast Cylinders

AIR COOLED CYLINDERS

S. Cheney and Son

MANLIUS, N.Y.

-200



Haskelite helps provide long life in the "Fleetster," fast commercial transport of the Consolidated Aircraft Corp.

LONG LIFE—

It is no longer unusual to produce planes that fly. Even special speed or other striking characteristics are discounted by operators unless the plane is able to stand up for long periods in use—and sometimes abuse.

The selection of Haskelite for all plywood applications is an example of designing for long life. The advantages of this blood albumin glued plywood are particularly important when used as in the "Fleetster" for wing covering.

Curtiss Flying Service

Air Associates, Inc.
Roosevelt Field,
Garden City, L. I.

California Panel & Veneer Co.
Los Angeles, Calif.

In Canada: Railway & Power Engineering Corporation, Ltd.

HASKELITE
MANUFACTURING CORPORATION
120 South La Salle St., Chicago, Ill.

A3-22-Gray

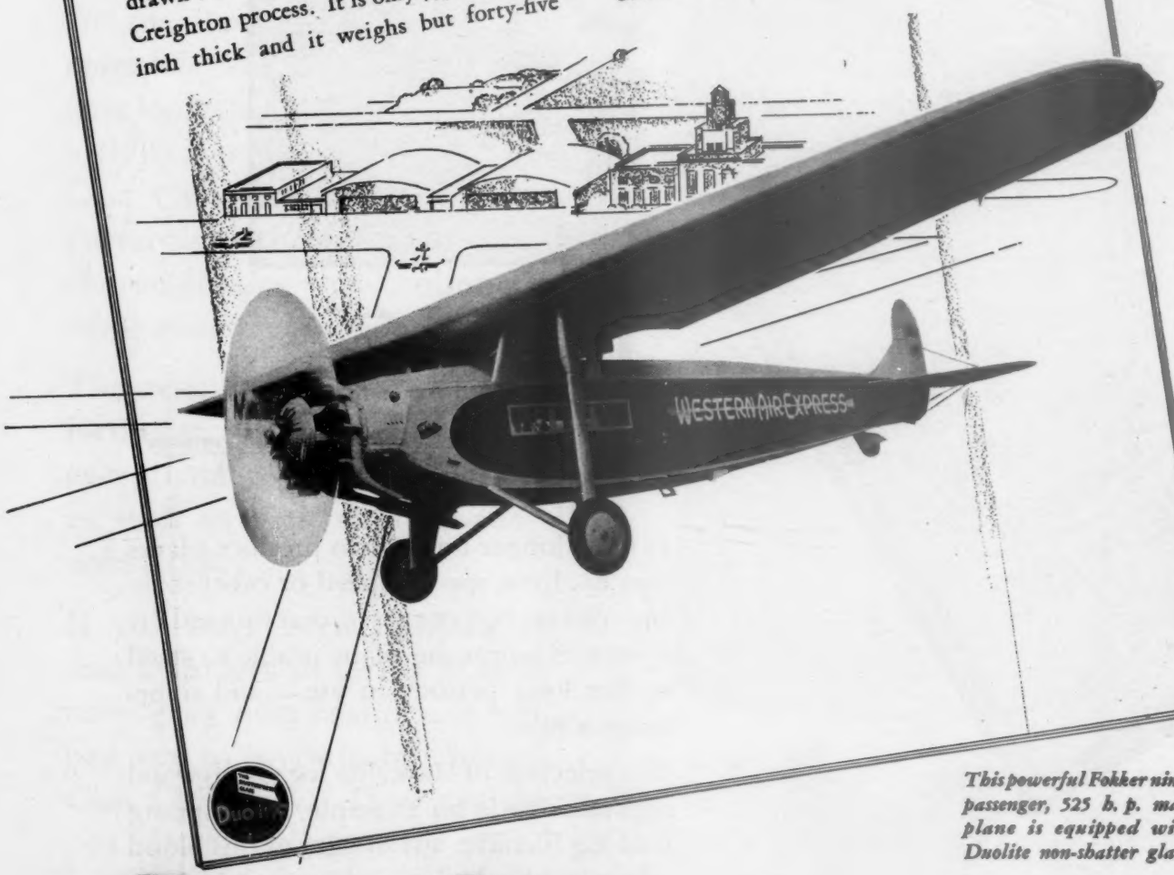
GLASS *that* ADDS *to* SAFETY

MAKERS of many commercial planes today are adding to the safety of their passengers by use of the new laminated glass—Duolite. For this flat, clear-vision glass is proof against shattering in event of forced landings on rough fields.

Duolite consists of two sheets of flat-drawn window glass laminated by the new Creighton process. It is only 7/32nds of an inch thick and it weighs but forty-five ounces per square foot.

We will be glad to send you full information about Duolite and our other types of non-shatter glass, including special *bent* glass for cock-pit windshields. These may be ordered through any of the Warehouses of the Pittsburgh Plate Glass Company, located conveniently in all leading cities.

DUPLATE CORPORATION
GRANT BUILDING PITTSBURGH, PA.



This powerful Fokker nine-passenger, 525 h. p. mail plane is equipped with Duolite non-shatter glass.

Duo-lite

NON-SHATTER GLASS FOR AVIATION USE

Thinnest laminated glass made. 1/8 to 5/32 in. thick. Weight 24 to 36 oz. per square foot.

AERO LITE Duplate

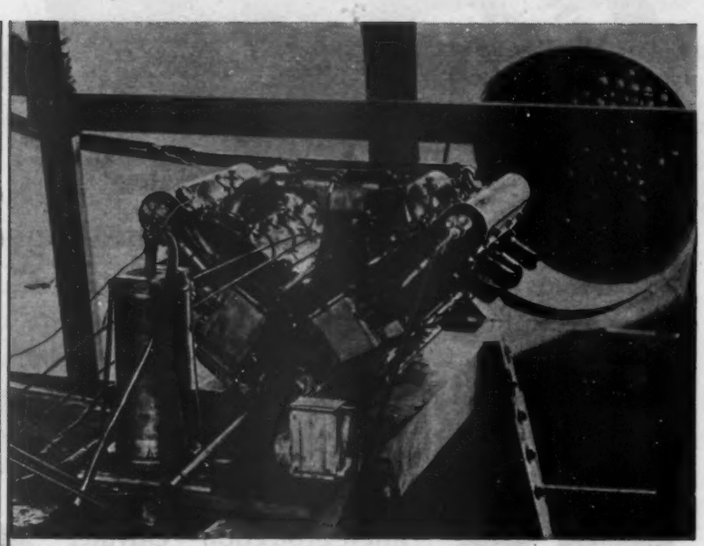
Duplate

Thinnest quality of fine plate laminated to 1/4 in. thickness. Weight 48 oz. per square foot.

Thompson Valves from Famous Cylinders

(This advertisement is one of a series showing Thompson Valves from some of the historic aero motors that used them in setting new world's endurance records)

...from the Wright E-2 300-hour Motor - 1921



The famous Wright E-2 motor that established a world-wide endurance record in 1921, mounted on government testing stand.

A photograph of two Thompson Valves after running 300 hours in the Anacostia test of 1921.

A WORTHY forerunner of modern world's record endurance flights was the venerable 180 H. P. Wright E-2 motor which survived the historic 300-hour full throttle block test by the United States Government at Anacostia, D. C., in the spring of 1921.

Two of the Thompson Valves which contributed to the remarkable ruggedness of this pioneer motor are shown on this page, exactly as removed at the end of 300 hours.

The performance of Thompson Valves at Anacostia was among the first of many endurance records that have influenced aeronautical engineers to install Thompson Valves in 95% of all American-built aero motors today.

THOMPSON PRODUCTS, INCORPORATED
General Office: **CLEVELAND, OHIO, U. S. A.**
Factories: **CLEVELAND and DETROIT**

Thompson Valves

WHERE UDYLITE BEAUTIFIES AND PROTECTS

Udylite Safeguards *the* World's Finest Speed-Boats

From the straining bow forward to the foamy wake streaming out aft, the speedboat is a delicate, quivering thing. This aristocrat of mahogany and brass is built around a powerful, carefully tuned motor with all its vital parts and exposed metal fittings protected by the Udylite Process. Here as elsewhere fine parts deserve the finest protection—Udylite.

Udylite

ADDING A PERMANENCE TO THE PRODUCT

All fine metal gets off to a fair start in its race against rust and corrosion over the stretches of land and sea. But soon after the installation, some glossy parts begin to limp along behind. Everyday varying weather conditions and bitter exposure gnaw away and undermine more and more of the iron and steel that is not fully protected and insured against the ravages of years.

It is to avoid this danger that Udylited metal guards speedboats and battleships, fine radio parts, automobiles, and delicate airplane parts. The Udylite Process makes a hard race also a long one when it adds permanent protection and beauty to exposed metal.

The UDYLITE PROCESS COMPANY

Eastern Office:
30 East 42nd St., New York

3220 Bellevue Avenue
DETROIT MICH.

Western Sales Office:
114 Sansome St., San Francisco, Cal.

the

OGDEN-OSPREY

. . . a six-place, trimotor ship of utmost SAFETY, COMFORT and ECONOMY, will be displayed for the first time at the DETROIT ALL-AMERICAN AIRCRAFT SHOW . . .

These features combine to make the OSPREY outstanding as a light transport plane . . .

safety

Three American Cirrus engines . . . maximum vision afforded by use of in-line motors . . . chairs secured directly to fuselage . . . wide landing gear . . . no propeller overlap . . . swing-over dep. control . . . improved type of independent brake control . . .

comfort

Sound-proof cabin . . . large roomy arm-chairs and ample leg room . . . lavatory . . . ventilating system assures fresh air in cabin . . . commodious aisle space . . . cabin door located close to ground . . . attractive cabin interior and furnishings . . .

economy

Low initial cost . . . 4-in-line, air-cooled motors give increased performance due to low head resistance . . . greatest payload per horsepower of any trimotor ship . . . total gas consumption only 18 gallons per hour with full load . . . accessibility of motors provides ease of adjustment and repair . . .

SPECIFICATIONS

Span	50 ft.
Chord	7 ft.
Length	34 ft. 6 in.
Height	9 ft. 3 in.
Weight, empty	2800 lbs.
Weight, loaded	4500 lbs.
Disposable Load	1700 lbs.
Payload	950 lbs.
Fuel Capacity	90 gals.

PERFORMANCE

High Speed	130 m.p.h.
Cruising Speed	102 m.p.h.
Landing Speed	50 m.p.h.
Cruising Range	500 miles
Service Ceiling	15,000 ft.

ILLUSTRATED BOOKLET WILL BE SENT ON REQUEST

OGDEN AERONAUTICAL CORPORATION

1119 SOUTH MARKET STREET

INGLEWOOD CALIFORNIA

STANOLIND AVIATION GASOLINE
STANDARD OIL COMPANY (INDIANA) SERVICE

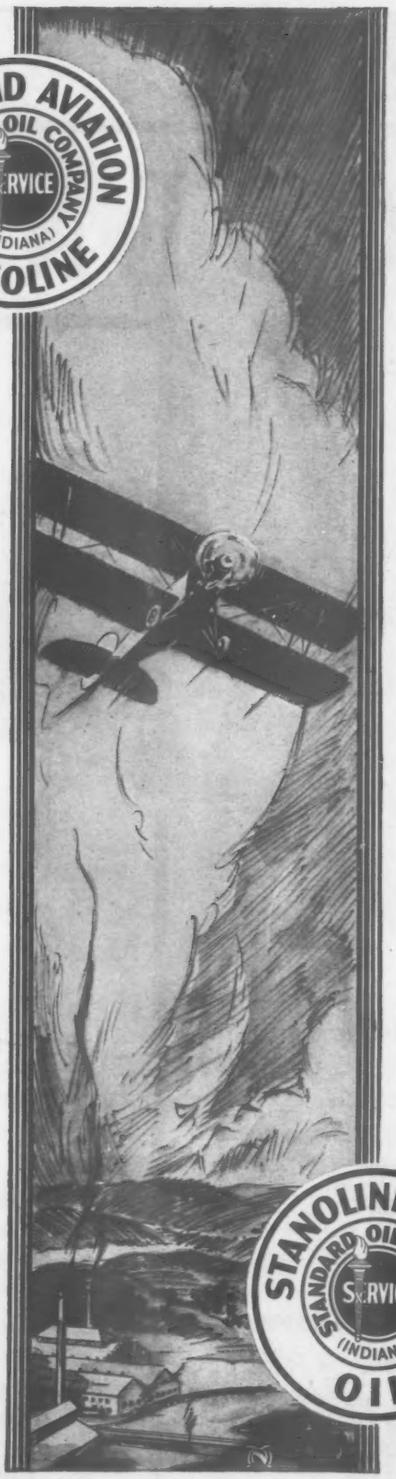
3 pioneers pass another milestone of dependable service

The passing of 1929 marked the close of another year of dependable service by the air mail . . . that pioneer of commercial aviation.

Likewise, 1929 marked the completion of a year of dependable service by two other pioneers in the aviation industry . . . Stanolind Aviation Gasoline, Stanolind Aero Oil. Early in the history of commercial aviation these two products began to contribute their share to the success of flying. No more convincing proof of the dependability with which they perform can be found than in the record they have made . . . many thousands of flying hours with never an engine failure traceable to any fault in either of these products.

Today Stanolind Aviation Gasoline and Aero Oils are better than ever. Constant research work keeps them up to date to meet the ever changing requirements for aviation fuel and lubrication.

Stanolind Aviation Gasoline and Aero Oils are well known at midwestern airports and preferred by the majority of pilots. These men know that they can rely on Stanolind Aero Products.



STANDARD OIL COMPANY
(INDIANA)
910 S. MICHIGAN AVE., CHICAGO, ILL.

For Quick Service use Air Mail

STANOLIND AVIATION PRODUCTS

AIRWAY BEACON TOWERS

U. S. Dept. of Commerce

RADIO BEACON TOWERS

T.A.T.

U. S. Dept. of Commerce

CEILING LIGHT and WIND CONE TOWERS

Port Columbus

BOUNDARY LIGHT SUPPORT

TRANSCONTINENTAL AIR TRANSPORT, INC.

T A T

ST. LOUIS, MO.

General Offices
Syndicate Trust Bldg.
10th and Olive Streets

July 10, 1929

International Derrick and Equipment Co.
Columbus, Ohio

Gentlemen:

Nearly a year ago when preliminary plans were being formulated for the elaborate airway communication stations of Transcontinental Air Transport, the selecting of appropriate radio antenna towers assumed a position of vital importance.

My past experience with International Derrick and Equipment Company towers, while in charge of the construction of several hundred miles of airway, led to the selection of more IDECO towers for this exacting duty, and I wish to express to you the real satisfaction afforded by my selection.

The IDECO radio towers ran true to form in that they were quickly and easily erected. The various parts fit with the nicety of a precision instrument, and properly primed and painted over the hot dip galvanized finish they stand as a permanent monument to progress and aviation.

Yours very truly,

C W Proctor

E. W. PROCTOR
Communications
T.A.T. Inc.

EWP:AB

90% of the World's Lighted Airways are using IDECO Beacon Towers

Years of specialization have given us an experience in building airway and airport equipment unequaled by any organization in the world.

IDECO equipment is used by the U. S. Army, Navy, Department of Commerce; The Transcontinental Air Transport Inc; The Texas Air Transport and by many Municipal and private airports.

Call or write our nearest branch, we will gladly give you the benefit of our experience in meeting your requirements.

CURVED ROOF STEEL HANGAR

THE INTERNATIONAL DERRICK & EQUIPMENT COMPANY

COLUMBUS, OHIO — HOUSTON, TEXAS — LOS ANGELES, CALIF.

New York · Pittsburgh · Wichita · Tulsa · Ft. Worth · Shreveport · Beaumont · Maracaibo, Venezuela

672

This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

Squelching another whispering campaign—

"Look out for that company, it's slipping," said the whisperers. Its product, an assembled unit sold to manufacturers to build into their machines, was of high quality but had been sold only through salesmen and direct mail.

Sales *were* falling off. The market, conscious of the gossip, was suspicious of the financial strength of the seller. This increasing sales resistance was undermining the morale of the sales staff.

With this serious situation facing it, the company called in an advertising agent who recommended an emergency advertising campaign in a McGraw-Hill publication covering the particular market. The program, the first publication advertising ever used by this company, consisted of color spreads in every issue.

That was only a year ago. Today, as evidence of the company's comeback, sales are not only mounting but the advertiser's chief competitor has offered to sell out to the new advertiser. *From bottom place to top position in recognition in one year.*

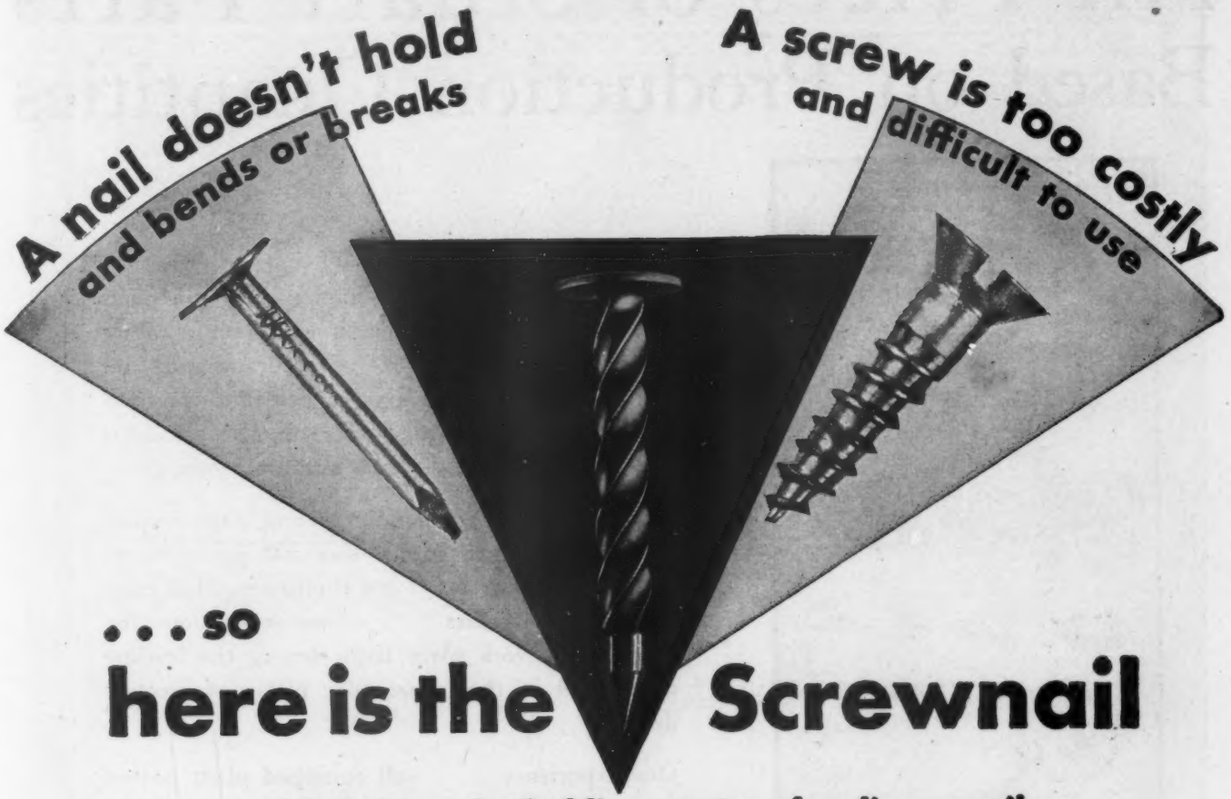
MORAL: Selling is not a choice between salesmen, publication advertising and direct mail but a matter of co-ordinating all three and using each on a basis of the job to be done.

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Detroit Philadelphia St. Louis
Greenville San Francisco Boston London

P-12

FOR FASTENING SHEET METAL TO WOOD



. . . so here is the Screwnail

. . . with 4 times the holding power of ordinary nails
. . . made so that it will not bend or break

BOTH common nails and wood screws are unsatisfactory makeshifts for fastening sheet metal to wood. You'll agree, though, that a combination of both would give you an ideal device for such work—a device that would drive like a nail, but hold like a screw.

Here it is—the Hardened Screwnail! Combines the driving qualities of a nail and the holding qualities of a screw. Designed expressly for fastening sheet metal to wood.

You can drive a Screwnail through sheet metal into wood much more easily and quickly than a common nail because of the hardened needle point. And having great tensile and shear strength it does not bend or break readily like a common nail.

Once in, the Screwnail *stays in*. It will not back out or pull out or loosen. Laboratory tests prove that Screwnails have over 4 times the holding power of ordinary nails.

The aviation industry will find this new Nail decidedly superior for use where sheet metal must be securely fastened to wood. Try them on your own work—we'll provide free samples for a test. Just tell us what you want to fasten.

1. No need to punch a hole...sharp needle point pierces sheet metal with ease.

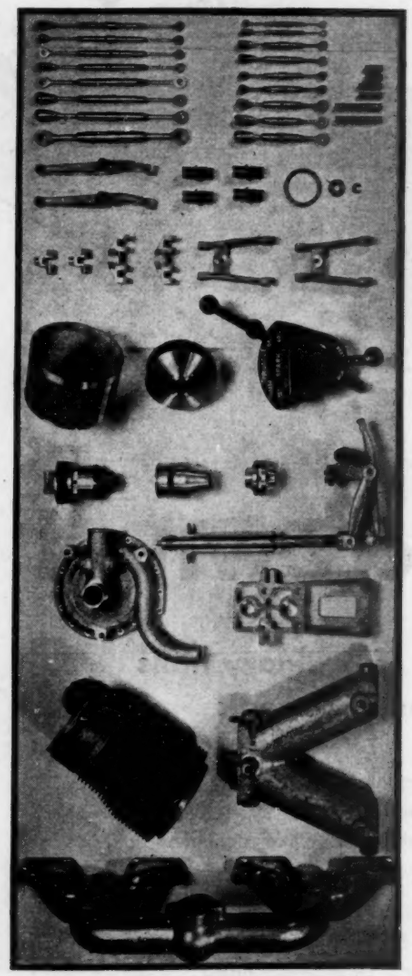
PARKER-KALON CORPORATION
Dept. M, 192-200 Varick St., New York, N.Y.

PARKER-KALON
HARDENED
*Screw*nails

PATENTED JAN. 29, 1924—No. 1482151
OTHER PATENTS PENDING

2. Hardened spiral thread forms a thread in sheet metal and wood. Anchors sheet metal securely to wood.

All Prices of Stuart Parts Based on Production Quantities

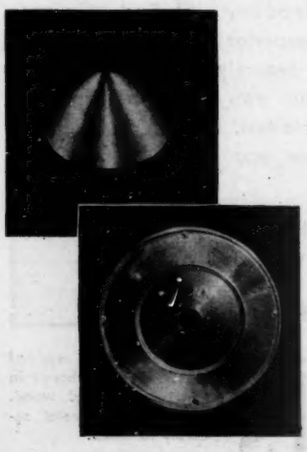


BEING actually in production on motor parts in our large, well-equipped plant . . . we can offer a greater degree of accuracy and finer workmanship . . . at a price per unit considerably below production costs on like products manufactured by individual aircraft producers.

For the design and manufacture of parts requiring the making of special dies and jigs . . . we offer you the services of our engineering staff composed of specialists . . . whose reputations for doing good work place them among the leading authorities in their particular phase of aircraft design.

Our experience . . . well equipped plant geared for straight line mass production . . . and the volume of business we do at a low selling cost . . . is helping many of America's leading aircraft producers to cut production costs.

Advise us of your requirements and we shall be pleased to serve you with satisfaction and profit.



Stuart Aero Products, Inc.

Manufacturers Motor Parts, Tanks and Cowlings

Thirteenth and Rutger Sts., St. Louis, Mo.

In addition to motor parts, we design and manufacture tanks and cowlings . . . which are welded from the best of materials . . . by expert workmen . . . under executive supervision and inspection.

You'll find it more economical in the long run to use Stuart tanks and cowlings.

Bird's Eye of the development as it will appear when completed

A dream is becoming a reality—

ON the outskirts of Baltimore an army of workmen are busy erecting an aviation center unique in aeronautic history. On a single, unbroken tract ideally suited to the purpose will be concentrated the new plant and laboratories of The Glenn L. Martin Company, together with a landing field of exceptional character, a harbor for seaplanes and — ultimately — an aeronautical school, a home-community for air-wise sportsmen, and a hotel for transient visitors. Two and a half million dollars is being invested in immediate construction.

The Glenn L. Martin Co.

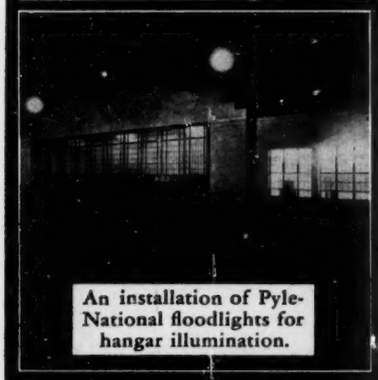
Builders of Quality Aircraft since 1909

BALTIMORE, MARYLAND

Type LAN landing light for built-in or retractable type mounting, 6″ and 9″ sizes.

Type LAN streamlined landing light for underwing mounting. 6″ and 9″ sizes.

Type NAV avigation lights for surface mounting on wings and rudder. Clear, green, or red shells.



An installation of Pyle-National floodlights for hangar illumination.

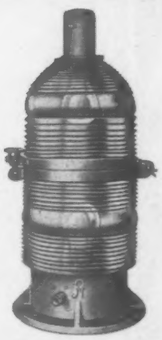
The PN COMPLETE LINE of

Airport and Aircraft lighting equipment, superior in performance, fully adapted to all present day operating requirements.

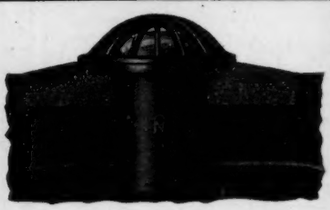
Pyle-National equipment and layout methods combine to produce efficient, economical airport lighting.

24 inch rotating beacon, of corrosion proof construction, meets latest Department of Commerce specifications.

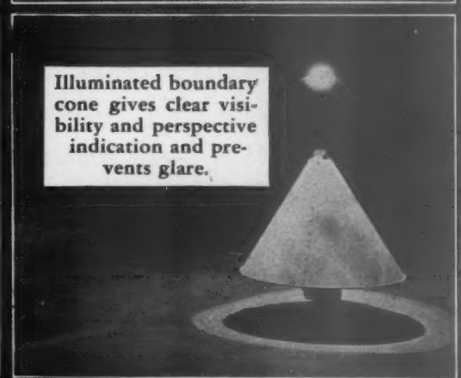
Type LANR prismatic lens landing light cuts head resistance and gives clear pick-up of ground details.



Electric Code Beacon, of weatherproof, cast aluminum alloy construction, for airways and tall obstruction marking.



Semi-submerged Runway Marker Light gives distinct light visibility even at low gliding angles. Cover 3″ high.



Illuminated boundary cone gives clear visibility and perspective indication and prevents glare.

Luminous tipped toggle switches of heavy duty construction for control of all types of aircraft lights.

Catalog 210-B with full descriptions of Pyle-National lighting equipment, including special wiring appliances, sent on request. Consult the Pyle-National engineering staff for assistance on any problems of application.

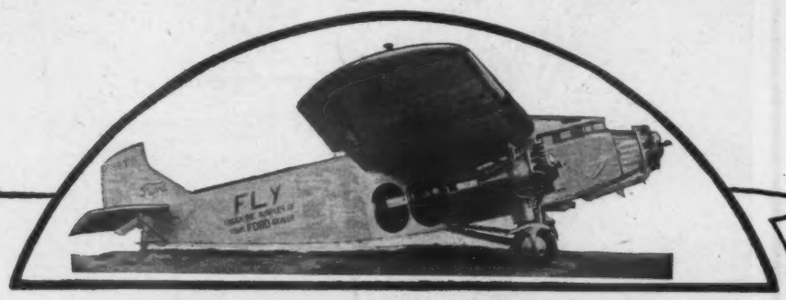
The Pyle-National Company

1334-1358 North Kostner Avenue , Chicago, Illinois, U. S. A.

A3-22Gray

UNIVERSAL FLYERS, Washington, D. C.

Establish New Record in FORD TRI-MOTOR with GULFPRIDE OIL 120



UNIVERSAL FLYERS
INCORPORATED
WASHINGTON, D.C.

Gulf Refining Company,
Pittsburgh, Penna.

Gentlemen:-

You will no doubt be interested in knowing something of the results that we have been obtaining through the use of GULFPRIDE OIL and GULF NO-NOX MOTOR FUEL in our Ford Tri-Motored All-Metal Monoplanes.

As you know, our planes have been used to make an educational tour, under the auspices of Ford Dealers, throughout the country. The first one of our ships was started out in September 1928, and in its first year, through the 15th of September 1929, made a world's record for plane and pilot, for the greatest number of passengers carried in any one airplane during a similar period; having carried more than 25,000 people, made over 4000 take-offs and landings, and having flown during that period approximately 70,000 miles. The most important feature of the accomplishment, we feel, is the fact that every flight was completed safely and never once was it necessary to make a forced landing.

We have just overhauled the motors now for the third time - the total number of actual flying hours being in excess of 900 - the cost of parts replaced at each overhaul was reasonably low, the parts used in this third overhaul totaling only $304.00 for all three motors.

Our Mr. Ray Loomis, formerly of the Ford Airport at Detroit, piloted this plane during the entire period and he, as well as ourselves, feel that this wonderful motor performance is due, in a great measure, to the constant use of GULFPRIDE OIL and GULF NO-NOX MOTOR FUEL.

A greater number of the fields that we operated from had untreated dirt runways and in dry weather our three motors blew up clouds of fine sand and dirt. This was particularly bad for us because of the great number of take-offs and landings that we made each day; our average flight being 15 minutes. In spite of this hard service, however, we found when the motors were torn down during each of the three overhauls, that there was a decided absence of the usual sludge; also that the bearings each time were in perfect condition and even at the third overhaul, did not show any appreciable signs of wear.

Airmindedly,
UNIVERSAL FLYERS
Incorporated
Jno J. Mocha

GULF

"GULFPRIDE OIL"

"America's Finest Aircraft Oil"

GULF REFINING COMPANY

The Curtiss Tanager, winner of the Daniel Guggenheim Fund prize for safety in aeronautics.

SRB BALL BEARINGS

in a Curtiss Challenger Engine Carried the Curtiss Tanager to Victory in the Daniel Guggenheim Safe Aircraft Contest

THE Guggenheim Safe Aircraft Competition was established "to achieve a real advance in safety of flying through improvement of aerodynamic characteristics without sacrificing the good, practical qualities of present day aircraft."

The Curtiss Tanager was the only entrant out of fifteen competitors to qualify on each factor of the competition.

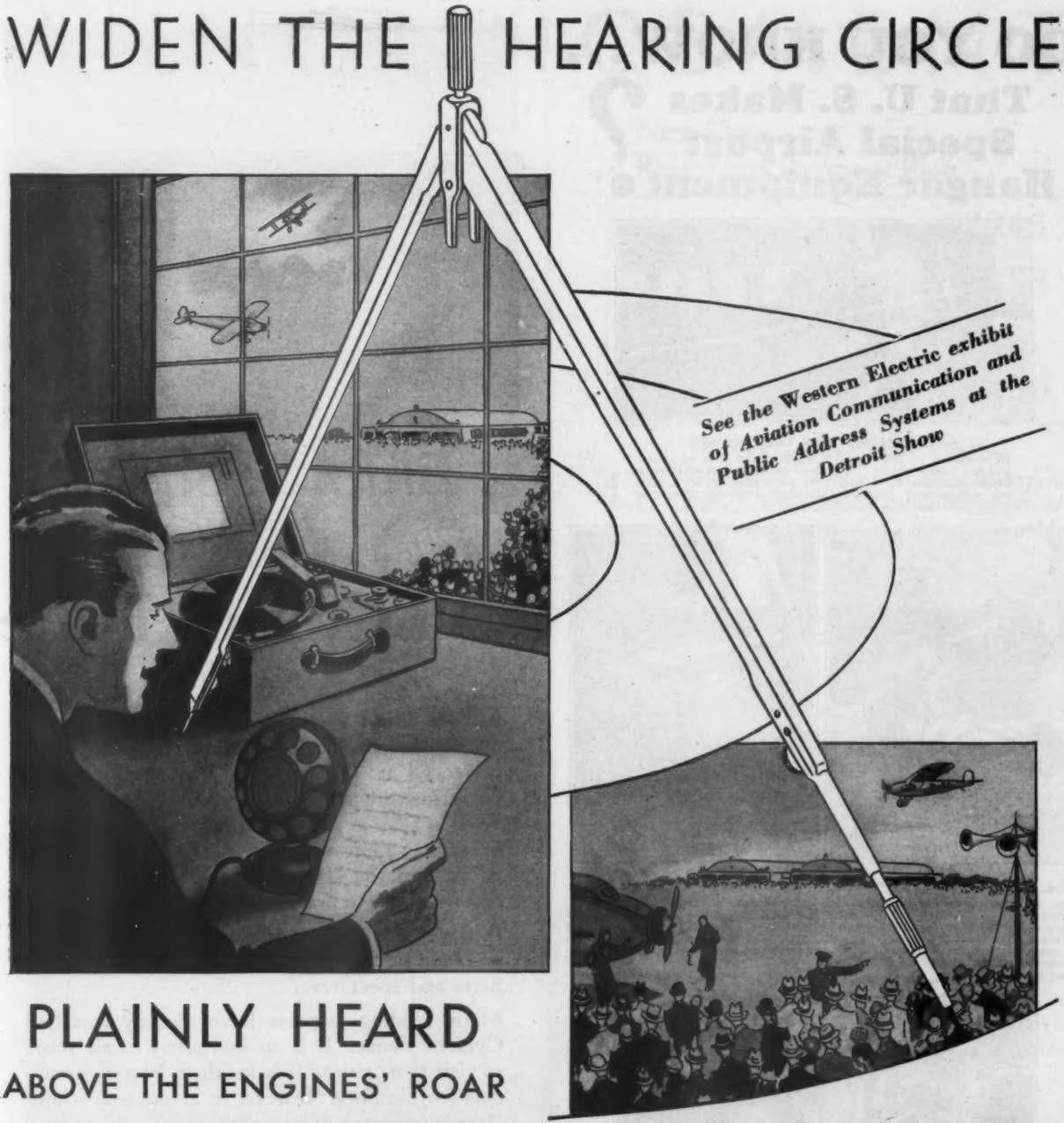
SRB Ball Bearings have been an important factor in the successes of practically every prominent aircraft engine manufactured in America since the advent of aeronautics.

STANDARD STEEL AND BEARINGS INCORPORATED
DIVISION OF MARLIN-ROCKWELL CORPORATION
Plainville, Connecticut

PACIFIC COAST DISTRIBUTORS
F. M. Cobbledick Co., *San Francisco, Cal.* E. D. Maltby Co., *Los Angeles, Cal.* Northwest Bearings Co., *Seattle, Wash.*

Ball SRB Bearings

WIDEN THE HEARING CIRCLE



See the Western Electric exhibit of Aviation Communication and Public Address Systems at the Detroit Show

PLAINLY HEARD
ABOVE THE ENGINES' ROAR

The announcer speaks—and the Western Electric Public Address System reproduces his words clearly from one or any number of loud speakers in various parts of the field.

Crowds are thus advised of the arrival and departure of planes and warned to keep the field clear; aerial manoeuvers are explained; individuals are quickly, easily paged.

With the Western Electric Music Reproducer, the same system "broadcasts" music to every corner of the field to attract and interest the crowd.

The Public Address System—made by your telephone makers—greatly increases airport efficiency by widening the hearing circle. It assures clear reproduction with sufficient volume to be heard at all times. It is thoroughly dependable.

For full details, write to Western Electric Company, Dept. 245A, 195 Broadway, New York, N. Y.

Western Electric

PUBLIC ADDRESS AND MUSIC REPRODUCTION SYSTEMS

DO YOU KNOW... That U. S. Makes Special Airport Hangar Equipment ?

Combination Air Compressor

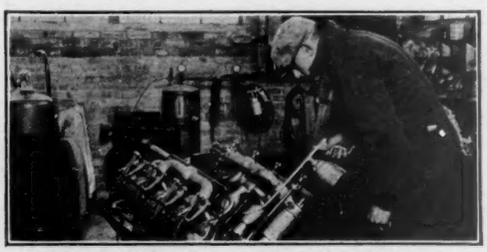
In addition to the world's outstanding line of standard air compressors, U. S. has developed special combination units with sufficient air capacity for spraying dopes and finishes, cleaning engines, operating blow guns and tire inflation.

Fast, Electric Power Greasing

The famous one-man electrically operated U. S. Grease Gun. Self-contained, with air compressor and grease pump compactly mounted on an easy running three-wheeled truck. Licensed under Alemite and Zerk Patents.

Paint Spray Units

U. S. makes 10 sizes of spray painting equipment — Heavy-duty and light-duty, portable and stationary units, also the combination air compressor units described above.



Engine Cleaner—A Very Popular Unit
Bench Blow Guns—Portable Air Compressors

SEND COUPON FOR BULLETIN

or write for expert information applied to your special needs.

U.S. AIR COMPRESSOR COMPANY
5348 Harvard Ave., Cleveland, Ohio

Send the new U. S. bulletin describing airport hangar equipment.

Name ..... Airport .....

Address .....

Enforce Safety at Your Airport with Cyclone Fence

The 5th Annual Air Tour last year proved that fencing is absolutely essential to the handling of crowds at airports. Many troubles were experienced at open airports. A magazine editor reporting the tour said "Crowds invaded the fields as soon as planes had landed. They milled heedlessly about while engines were being warmed up and the absence of fatalities can be accredited only to providential intervention."

But where airports are fenced, crowds are always out of danger, adding to the safety of both fliers and spectators.

Many leading airports have already installed Cyclone Fence. It is an invitation to air tours to visit their cities. It helps them become terminals for air lines. Interest in aviation is stimulated by absence of casualties.

Cyclone Fence is made of durable copper-steel and lasts for years in any climate. Special wide gates for airports. Erected on H-Column line posts for maximum strength. Installed by our own trained crews. Service everywhere.

Write for information.
No obligation.

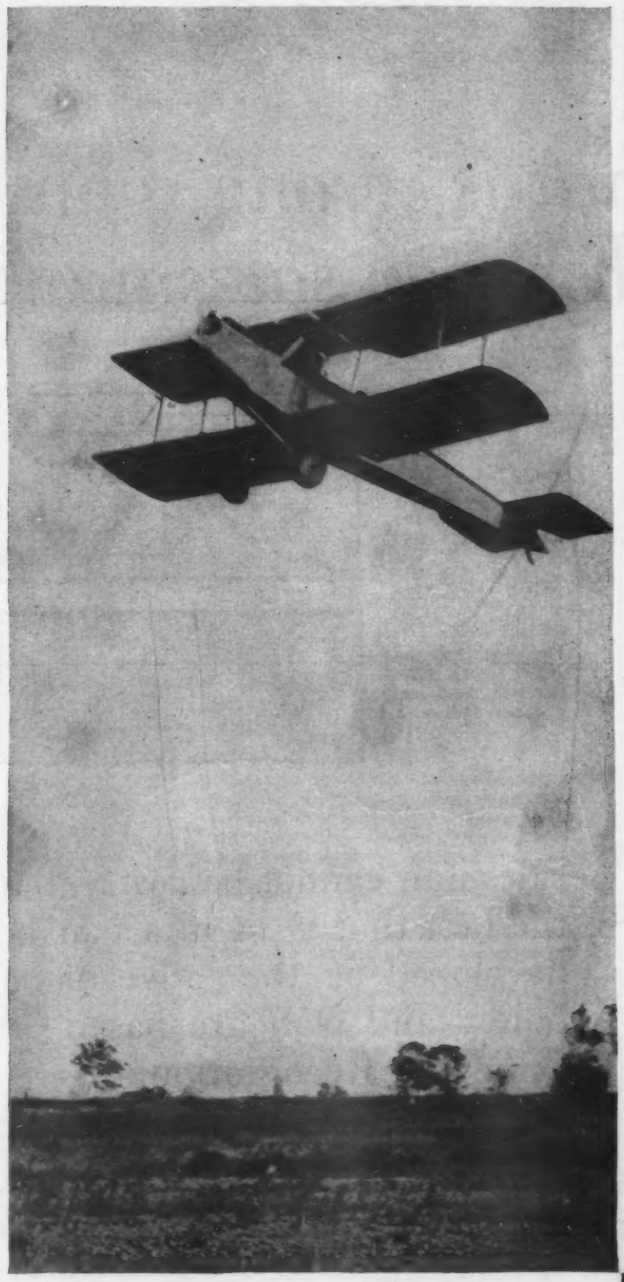
CYCLONE FENCE COMPANY
Subsidiary of
UNITED STATES STEEL CORPORATION
General Offices: WAUKEGAN, ILL.
Branch Offices in All Principal Cities
Pacific Coast Division: Standard Fence Co., Oakland, Calif.

All chain link fence is not Cyclone. This name plate identifies the genuine Cyclone Fence.

Cyclone Fence
REG. U.S. PAT. OFF.

© C. F. Co. 1930

ANNOUNCEMENT



A New Price . . .
A Real Time Payment Plan

WHITTELSEY AVIAN . . .	$3845
DOWN PAYMENT, about . .	$1358
Balance monthly payments.	
HANDLEY PAGE WING SLOTS (extra)	$450

All prices F. O. B. Bridgeport, Conn.

IN the short space of one year since its arrival in America, the famous Avian has been accepted by the great part of the American public as representing the maximum of safety in the air.

At the International Aircraft Show, just concluded, in St. Louis, the Whittelsey Manufacturing Company presented the 1930 Avian with all its well known safety features plus a refinement of detail and quality of equipment well in advance of common practice.

And we announce at this time a reduction in price, based on quantity manufacture, coupled with a time payment plan which immediately makes the ownership of an Avian a highly practical investment for business or sport.

Here is downright safe performance that no other light plane can equal. And economy that can't be beaten—the Avian makes every gallon of gas give 20 miles of travel. *You can now buy an Avian for about $1358.00 down and balance in monthly payments.* Write today for full information on the plane that's built for sport, safety and economy.

To Dealers and Distributors

When you fly or sell the Whittelsey Avian you have something to talk about. No other light plane has such a record of performance . . . or the equipment. Dealers and distributors are still being appointed. Write for our sales plan and for full data and specifications of the plane itself. The Whittelsey Manufacturing Company, 225 Howard Avenue, Bridgeport, Conn.

WHITTELSEY AVIAN

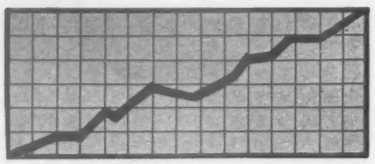
IN AMERICA
WHITTELSEY AVIAN
AVIAN
IN ENGLAND

THE OUTSTANDING SPORT AND TRAINING PLANE OF THE WORLD

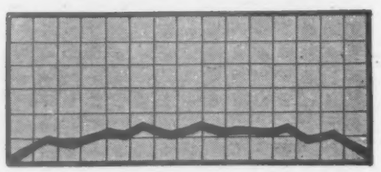
This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

What is wrong with this star salesman?

With the BBK Crane Company he was a phenomenal success.



He went with the XYZ Crane Corporation and was a dismal failure.



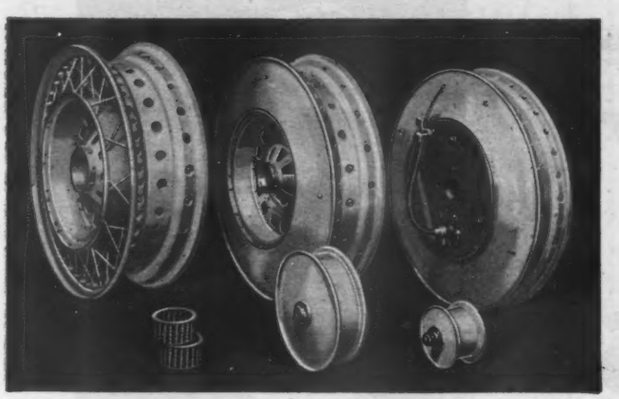
The difference is not in the salesman nor in the product but in the nature of the Industrial Advertising backing him. Every industrial salesman cannot be a star, but the best that is in him can be developed if the advertising policy and plan are based on achieving Recognition.

How to build this recognition in ten simple steps is graphically explained in the book, "Industrial Marketing at Work." A copy will be delivered by the nearest McGraw-Hill office to any executive responsible for sales or advertising to industry.

McGRAW-HILL PUBLICATIONS

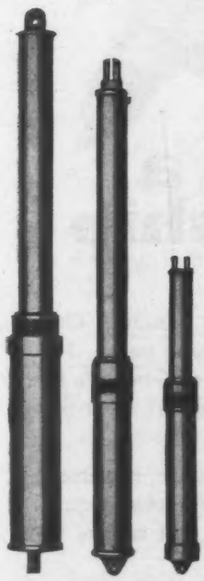
New York Chicago Cleveland Detroit St. Louis
Philadelphia Greenville San Francisco Boston London

F-13



Aircraft Products Corporation's wheels and brakes are manufactured in a range of sizes for aircraft of every type and capacity.

Serving the *Entire* Industry



Oildraulic Shock Struts are produced in any size or length to meet requirements of individual aircraft manufacturers.

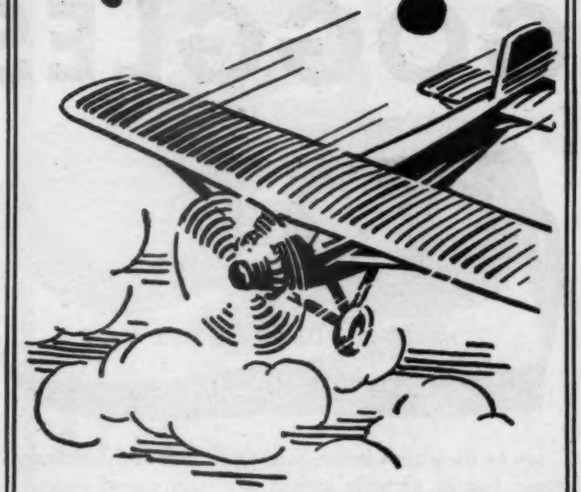
In specializing in the manufacture of airplane parts exclusively, we are rendering a unique service to the entire industry. Our engineering staff has been carefully selected and comprises recognized authorities on specialized phases of aircraft design . . . . our manufacturing facilities, geared for straight line mass production, are cutting production costs for America's leading aircraft producers . . . . the volume of our business permits modern production methods insuring a greater degree of accuracy and finer workmanship at a lower cost per unit. Put your problems up to us . . . . write today. Let us show you how you can profitably avail yourself of this extraordinary service.

AIRCRAFT PRODUCTS CORPORATION OF AMERICA
DETROIT, MICHIGAN

Designers and manufacturers of Airplane Wheels and Brakes, Axles and Complete Undercarriages, Tail Wheel Assemblies, Oildraulic Shock Struts, Airplane Skis, Pontoons, Wing-tip Floats, Flying Boat Hulls, Gasoline and Oil Tanks, Numerous Parts and Special Fittings.

Aircraft Products
CORPORATION
OF AMERICA

Safe!



Where there is no landing there must be no failure.

For SPRINGS of any kind, of any material, for any purpose in motor, controls or landing gear, use

GIBSON-SPRINGS

WM. D. GIBSON CO.
1800 Clybourn Avenue
CHICAGO, ILL.

SEND FOR OUR CATALOGUE

Now you can have

Non-Shatterable Lenses in Your LUXOR GOGGLES

MEYROWITZ LUXOR GOGGLE No. 8

...not in the plain window-pane type...not in the ordinary bent lenses, but in perfectly ground *spherically* curved lenses — providing absolute safety and correct vision for flier's eyes. Spherically curved ground lenses avoid disagreeable and dangerous distortion, blurring and reflection. They provide a correct and unusually wide angle of vision at all times and under all conditions. The combination of these features is a scientific achievement, perfected in the Meyrowitz laboratories—and will be found only in Luxor Goggles.

Never before has optical science achieved true spherically deep-curved ground lenses in non-shatterable glass.

Note the perfect curvature from end to end and from top to bottom . . . an absolutely accurate spherically deep-curved lens.

In addition to non-shatterable spherically curved ground lenses, the new Luxor No. 8 is notable for the new WIDE, FLARING FEATHER EDGE CUSHIONS which provide better protection with no pressure; DURALUMIN FRAMES for lightness and strength; MICRO ADJUSTABLE BRIDGE: NON FOGGING VENTILATING CIRCUIT to prevent sweating, fogging and to keep air currents and foreign matter away from the eyes.

THE NEW

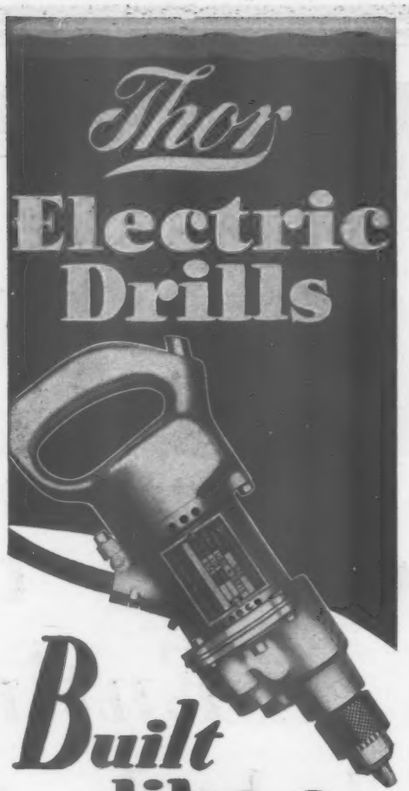
LUXOR GOGGLES No. 8 — optically ground and polished lenses, either Army or Navy specifications $18

LUXOR GOGGLES No. 8 — with non-shatterable ground and polished spherically curved lenses $36

LUXOR, U. S. AIR SERVICE GOGGLES No. 6 and No. 7 — with non-shatterable lenses . . . . . $32 and $34

E. B. Meyrowitz INCORPORATED AND ASSOCIATED COMPANIES *Send for catalogue*

520 Fifth Ave., Dept., C., New York



Built like a Battleship

FROM spindle end to grip handle a Thor is built of rugged, easy running parts. It has power—more than you'll ever use, but it's there for emergency. It's speedy—a super-power motor takes care of that.

A Thor will stand hard, severe use, because it is built to withstand it. It will bite its way quickly through iron, steel or wood and makes short work of difficult jobs.

Thor dependability is an important thing to you, and a feature which we cannot stress too much. To know, absolutely that a Thor will respond when you press the switch, is a valuable advantage that will appeal to you.

For fast drilling—for light drilling—for heavy drilling—or any kind of drilling—a Thor will outperform any drill of the same capacity.

Thor Electric Drills are built in a complete line of sizes and types. Included are screw drivers, nut setters, tappers, grinders and reamers. Write for catalog No. 17.

TOOLMAKERS SINCE 1893

INDEPENDENT PNEUMATIC TOOL CO.

PNEUMATIC TOOLS — 232 So. Jefferson St. Chicago, Ill. — ELECTRIC TOOLS

NEPCO *School of* AVIATION

announces opening of its Northern School of Flying at its own Mile Square Airport on April 10th.

NEPCO—offers you a complete course in aviation. Private Pilot's 25 hour course—$475.00. Limited Commercial 50 hour solo and necessary dual $875.00. Transport Pilot's Course 200 hours solo, $3,500.00.

Fairchild K R Biplanes, Curtiss Robin and Fairchild Monoplanes used for instruction.

NEPCO was first school to give its Transport Students instruction on a Ford Tri-Motor plane, all Transport Pilot students are given a minimum of 10 hours flying in this giant Air Liner.

Dormitory located at Airport where room and board can be had for $8.00 per week.

Finest Golf Course in Wisconsin adjoins airport and available to Nepco Students.

Fishing, Bathing and Boating in Beautiful Nepco Lake.

Ground work includes all subjects required by U. S. Dept. of Commerce.

20 Hours of Radio Telegraphy given each L. C. and Transport student pilot.

Nepco Students flew 352 hours during month of February at its winter base at St. Petersburg, Florida.

99% of all Nepco Students passed required tests of U. S. Dept. of Commerce in past two years of operation.

50 hour L. C. Course can be completed in ten weeks.

"Terms to Transport Students." Enrollments being received now. For information write or wire.

NEPCO School of Aviation

Operating Wisconsin's largest and finest Airport and School.

Capt. L. G. Mulzer, Gen. Mgr., Wisconsin Rapids, Wis. DISTRIBUTORS—Fairchild Airplanes. Dealers, Curtiss-Wright Airplanes.

If it's
DEPENDABILITY
you want...

...to keep your Production Lines on the move, Barnes-made Springs have been building a reputation for dependable service for years. Won't you tell us your spring requirements —one or a million?

★

The Wallace Barnes Co.
BRISTOL, CONN., U.S.A.

DON'T STAY AGROUND

Fly With a
MONOPLANE CESSNA GLIDER

LEARN the rudiments of flying—safely and economically—with a glider. This new sport has more possibilities than that of sport alone. A glider offers a training means to all air minded individuals, young or old, men or women. . . . . .

Built by the builders of the famous Monoplane Cessna, this glider is more than an experiment. It has proven its air-worthiness by exhaustive tests.

Priced $398 f. o. b. Wichita. . . . . Reserve yours today.

ATTRACTIVE DEALER PROPOSITION AWAITS YOU.

CESSNA AIRCRAFT CO.
WICHITA, KANSAS

Bellanca Saves Over 50% Finishing Time

Where there was hand surfacing. Now there is a TAKE-ABOUT Sander.

Over 50% saving in time and labor is accomplished by PORTER-CABLE Disc Sanders at the Bellanca plant. Four of these machines are used for sanding corner blocks, joints and other wooden parts. Compound angles quickly secured.

PORTER-CABLE Sanders, Disc, Spindle and Belt are widely used by leading plane builders.

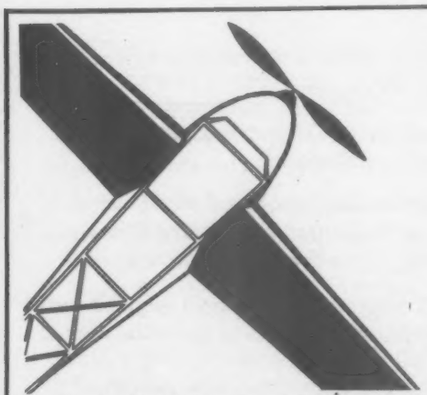
The TAKE-ABOUT Portable Electric Belt Sander, shown at the left, reduces the cost of finishing wing parts and scraping and planing jobs formerly done by hand. 5 to 10 times faster than hand sanding. Operates from ordinary light socket.

PORTER-CABLE Sanders are the most widely used in the world.

The Porter-Cable Machine Co.
Lodi & Wolf Sts., Syracuse, N. Y.

PORTER—CABLE
SANDERS

3605



SEAMLESS STEEL TUBING

The final safety of all aircraft is absolutely dependent on the *uniform* strength of the frame.

It is significant that a growing number of companies use Service Seamless Steel Tubing exclusively for this purpose.

All Aircraft Grades

WAREHOUSE STOCKS for immediate shipment in any quantity.
MILL SHIPMENTS for substantial production requirements.

SERVICE STEEL COMPANY

19 SCOTT ST.
BUFFALO

32 E. FRONT ST.
CINCINNATI

1435 FRANKLIN ST.
DETROIT

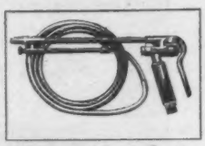
216 N. ALEMADA ST.
LOS ANGELES

SAVE
TIME
and
EXPENSE
in

ENGINE CLEANING

In the grooming of airplane engines, compressed air has come to play an almost indispensable part. Not only does the Brunner method show big economies in time and expense over the other methods, but a neater, more thorough job is possible . . . Such is the unanimous testimony of scores of airplane mechanics.

But engine cleaning is only one of many airport chores which Brunner-Air performs. Improved spraying of wing dope and finishes, economical valve grinding and testing, greasing, tire inflation—these services are all done better with Brunner equipment.



No. 78 Engine Cleaner

The illustrations to the right show two popular engine cleaning devices. Engine Cleaner No. 78 may be used for blowing and dusting as well as cleaning in the manner illustrated above. No. 79, designed for spray lubrication, can be effectively used as an engine cleaner. The cup holds one quart. .

No. 79 Engine Cleaner

Aircraft Division
BRUNNER MFG. CO.
UTICA, N. Y.

MODEL 854

This Brunner Compressor is ideally suited to general airport duty. It is stoutly constructed after the improved Brunner design, and incorporates all recent refinements. For complete details and specifications see page 25 of the Brunner Manual.

GET THIS BOOK
The Brunner Air Compressor Manual contains complete information on the profitable application of compressed air in the aircraft industry. Write for your copy today.

BRUNNER
AIR COMPRESSORS

PROTECTING THE NATIONAL AIRPORTS

PREVENT *tampering*

FENCE *your* AIRPORT *with* ANCHOR

A faulty engine—a broken strut—an erring instrument and other causes of serious crack-ups can many times be traced to the destructive hands of tamperers. Protect the ships on the line with an Anchor Fence.

An Anchor Fence will keep tamperers at a distance. Have the nearest Anchor Fencing Specialist submit a plan and estimate.

ANCHOR POST FENCE COMPANY
Eastern Ave. and Kane St., Baltimore, Md.

Albany Boston Buffalo Charlotte Chicago Cleveland
Detroit Hartford Houston Los Angeles Mineola, L.I. New York
Philadelphia Pittsburgh St. Louis San Francisco Shreveport

Representatives in all principal cities. Consult your local classified directory.

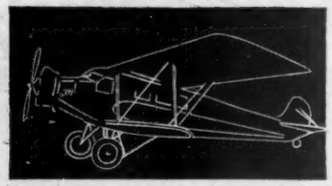
ANCHOR FENCES
MADE BY THE MAKERS OF AMERICA'S FIRST CHAIN LINK FENCE

DESIGN

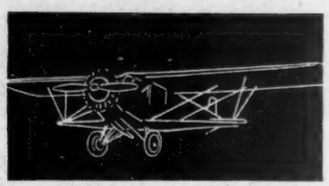
Buhl produced the original closed sesqui plane in 1927—two wing construction with the lower much smaller in area than the upper. The advantages of this type are many. Primarily it has the strength of the biplane. The upper span, shorter than in mono design, requires less hangar space and gives faster manoeuverability, and easier landing. It has greater inherent stability and permits slower and safer landing speeds. The takeoff is quicker. There is far greater strength per pound. Buhl planes carry no load on the tail. The wings with their double camber have a very small center of pressure travel and carry the load of the cabin and passengers. Structurally, a Buhl has never failed. May we send you detailed information?

BUHL AIRCRAFT CO.

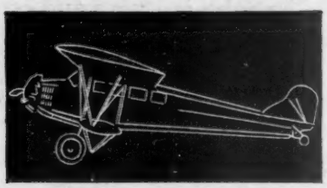
MARYSVILLE :: :: MICHIGAN



The Buhl Senior Airsedan is an eight-place dual-control plane, priced at $18,500 with the Wasp engine and $19,500 with the Hornet or Cyclone.



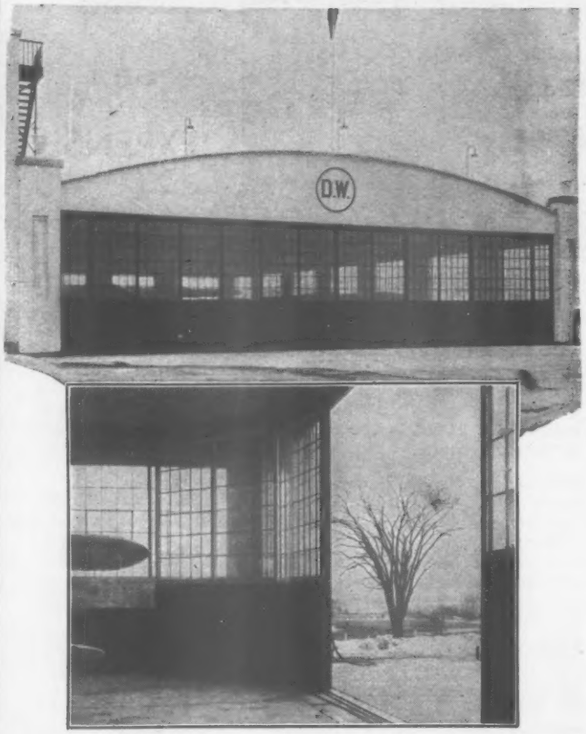
The Buhl Sport Airsedan is a three-place dual-control plane, priced at $12,000 with J-6 Wright Whirlwind engine and $11,000 with the J-5.



The Buhl Standard Airsedan is a six-place, dual-control plane, priced at $13,500 with the J-6 Wright Whirlwind engine.

Buhl
Air— Sedans
SENIOR·STANDARD·SPORT

STANDARDIZED HANGARS



New D. W. Flying Service Hangar at LeRoy, N. Y., near Rochester. Truscon Steel Hangar Doors, Curved Track Type.

Truscon has specialized in housing for aeronautical requirements. Truscon Standardized Hangars—furnished in sizes and types for individual requirements—provide clear floor space, thorough fire protection and ample daylight. These permanent hangars can be readily enlarged or re-erected in a new location.

Truscon Steel Hangar Doors open the full width to permit the easy handling of airplanes. They operate easily and are sturdily built to give enduring service. They are furnished in all sizes and may have large glass areas for daylighting. Two types—Straight or Curved Track—are available to meet any hangar requirement.

Write for suggestions, quotations and literature.

TRUSCON STEEL COMPANY
YOUNGSTOWN, OHIO

Warehouses and Offices in Principal Cities
Truscon Steel Company of Canada, Limited,
Walkerville, Ontario

A PRODUCT OF TRUSCON

Built NOW
While Costs
Are LOW

STEEL HANGAR DOORS

HIGH GRADE
Gears – Cams – Precision Parts

INDIANAPOLIS TOOL & MFG. CO.
INDIANAPOLIS, INDIANA

Finest Aircraft Quality

SPRUCE

Delivered finished to Specifications . .

A complete service bringing you spars, ribs, and other parts of finest quality spruce, finished exactly to your specifications. Buying your spruce requirements this way offers substantial savings in freight costs and assembly time, while our ample facilities and the fact that we have the pick of the spruce production assure scheduled delivery and the highest quality material. Let us quote you.

Complete Spruce

GLIDER SETS

We are making, to Glider Club specifications, or blue prints, selected spruce parts in completely finished sets, ready to assemble. Highest grade material, properly kiln dried, milled to exact size and form. If you plan to build a Glider, send for more details and prices.

Posey Manufacturing Company
Hoquiam Washington

PASSENGER comfort necessitates careful selection of fabrics for attractive cabin plane interiors. "Aerovel" mohair fabrics have been designed especially for this purpose. Samples and prices upon request.

"AEROVEL"
MOHAIR FABRICS
FOR
AIRPLANE CABIN INTERIORS
The Shelton Looms

The Shelton Looms
AIRPLANE FABRICS DIVISION
ONE PARK AVENUE · NEW YORK

Mid-western Representative:
J. E. Menaugh Company
4618 Kenmore Avenue
Chicago, Illinois

Lowest Prices

Quantity purchases of supplies enable us to offer highest quality products at prices far below prevailing market prices—and "We Ship the Same Day."

Nicholas-Beazley Airplane Company Inc.
Marshall -- Missouri

Western Branch—3769 Moneta Avenue, Los Angeles, Calif.

AXELSON

150 H. P. Radial Air-cooled

Approved Type Certificate 16

AIRPLANE

Ask for Catalog

Axelson Aircraft Engine Co.
Boyle Ave. and Randolph St.
(P. S. Box 337) Los Angeles, Cal.

ENGINES

SEAPLANE FLOATS

FLYING BOAT HULLS

SEYMOUR J. BAUM, Inc.
268-288 Albion Street Elmhurst, L. I.

MACHINES and TOOLS for FACILITATING SHEET METAL OPERATIONS in AIR CRAFT CONSTRUCTION

Catalogue No. 25-A free for the asking

THE PECK, STOW & WILCOX CO., Southington, Conn.

Cunningham-Hall Airplanes

All-metal structure — insures durability, lower maintenance and greater safety.

Manufactured by
CUNNINGHAM-HALL AIRCRAFT CORPORATION
13 Canal St.
ROCHESTER, NEW YORK

PITCAIRN AIRCRAFT

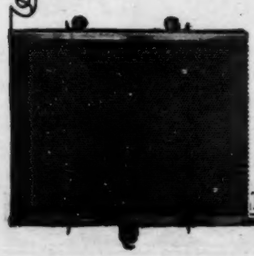
For Air Mail use . . . . . MAILWING

For Sport or Business use . SPORT MAILWING

PITCAIRN AIRCRAFT, Inc.
Pitcairn Field, Willow Grove, Pa.

G&O

Radiators and Oil Coolers for Aircraft



EFFICIENT
LIGHT WEIGHT
DEPENDABLE

The G&O Mfg. Co., New Haven, Conn.

Only reliable products can be continuously advertised

SER-O-PLY

SERUM SEALED PLY-WOOD

BLOOD ALBUMEN GLUE — HOT PLATE PROCESS

Aircraft Plywood

STOCK PANELS, A & N. SPECIFICATIONS for Immediate Shipment

Widths—24-in., 36-in. and 48-in.
Lengths—48-in., 60-in., 72-in. and 90-in.
Thicknesses—1/16-in., 3/32-in., 1/8-in., 3/16-in. and 1/4-in.
Faces—Mahogany and Birch.

3 ply Birch panels 36-in. x 60-in.; 1/32-in., 1/24-in. and 3/64-in. thicknesses.
Special sizes and constructions manufactured to your specifications.
Inquiries solicited for plywood—cabinet work and fabricated airplane wood parts.

THE CARROM COMPANY

LUDINGTON, MICHIGAN

Established 1889 Capital and Surplus $800,000

Sole Licensed Manufacturers of Blood Albumen Glue under H. L. Haskell Patent Rights.
Patent Nos. 1,516,566 and 1,516,567

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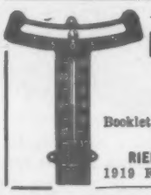
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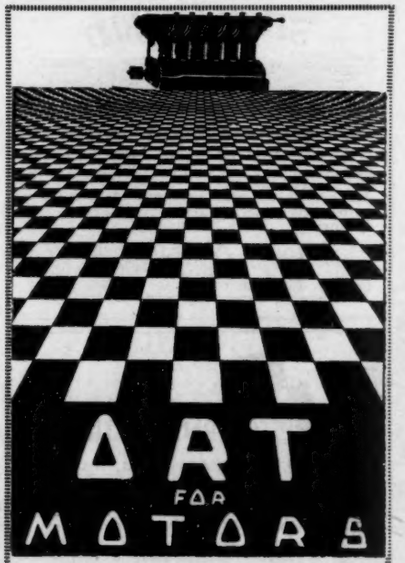

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ALPHABETICAL INDEX TO ADVERTISEMENTS

Name	Number
Aircraft Products Corp. of America	51
Airport Development & Construction Corp.	8
American La France & Foamite Corp.	17
Anchor Post Fence Co.	55
Austin Co., The	25
Axelson Aircraft Engine Co.	58
Barnes Co., Wallace	53
Baum, Seymour J., Inc.	58
Brunner Mfg. Co.	55
Buhl Aircraft Co.	56
Carrom Co., The	59
Central Airport, Inc.	Inside Back Cover
Cessna Aircraft Co.	54
Chase & Co., L. C.	23
Cheney & Son, S.	32
Cleveland Pneumatic Tool Co.	31
Consolidated Aircraft Corp.	10
Cunningham-Hall Aircraft Corp.	58
Cyclone Fence Co.	48
Detroit Aircraft Corp. Div. of Lockheed Aircraft Corp.	28
Duplate Corp., The	34
Electric Storage Battery Co., The	12
Fleet Aircraft, Inc.	9
Fokker Aircraft Corp. of America	30
Formica Insulation Co., The	26
G & O Mfg. Co.	58
General Electric Co.	20 & 21
Gibson Co., The Wm. D.	51
Goodyear Tire & Rubber Co.	24
Gruss Air Spring Co.	15
Gulf Refining Co.	45
Haskelite Mfg. Corp.	33
Independent Pneumatic Tool Co.	52
Indianapolis Tool & Mfg. Co.	57
International Derrick & Equipment Co.	39
Irving Air Chute Co.	22
Kelsey-Hayes Wheel Corp.	6
Keystone Aircraft Co.	18
Kinner Airplane & Motor Corp.	13
Light Manufacturing & Foundry Co.	29
Lockheed Aircraft Corporation	28
McGraw-Hill Book Co.	64
McGraw-Hill Publishing Co.	40 & 50
Martin Co., The Glenn L.	43
Meyrowitz, Inc., E. B.	52
Nepco School of Aviation	53
Nicholas-Beazley Airplane Co., Inc.	58
Ogden Aeronautical Corp.	37
Parker Kalon Corp.	41
Peck, Stow & Wilcox, The	58
Pennzoil Co.	16
Pitcairn Aircraft Inc.	58
Porter-Cable Machine Co.	54
Port Oxford Cedar Products Co.	7
Posey Mfg. Co.	57
Pratt-Whitney Aircraft Co.	Back Cover
Pyle National Co., The	44

Name	Number
Scintilla Magneto Corp.	65
Searchlight	60-61-62-63
Service Steel Co.	54
Shelton Looms	57
Sikorsky Aviation Corp.	27
Stanavo Specification Board	Inside Front Cover
Standard Oil Co. of Indiana	38
Standard Steel & Bearings, Inc.	46
Stromberg Motor Devices Co.	11
Stuart Aero Products, Inc.	42
Summerill Tubing Co.	59
Supreme Propeller Co.	59
Texas Pacific Coal & Oil Co.	2
Thompson Products Inc.	35
Timken Roller Bearing Co., The	19
Truscon Steel Co.	56
Udylite Process Co.	36
Union Carbide & Carbon Corp.	14
U. S. Air Compressor Co.	48
Universal Aviation Corp. (Robertson Div.)	59
Viking Flying Boat Co., The	4 & 5
Watkins' Aircraft Co.	66
Western Electric Co.	47
Whittelsey Mfg. Co.	49
Wilkening Mfg. Co.	3

Searchlight

Classified Advertising

Name	Number
BUSINESS OPPORTUNITIES	63
EMPLOYMENT SERVICE	63
EQUIPMENT WANTED	63
MISCELLANEOUS	63
POSITIONS VACANT	63
POSITIONS WANTED	63
REPRESENTATIVES AVAILABLE	63
REPRESENTATIVES WANTED	63
SALESMEN AVAILABLE	63
SALESMEN WANTED	63
SCHOOLS MISCELLANEOUS	63
USED AND SURPLUS EQUIPMENT	62-63

Aircraft Service Directory

All-American Glider Co	60
Air Associates, Inc	60
Boston Auto Gage Co	60
Beck Distributing Co	60
Burgess Norton Mfg. Co	60
Cox & Son, John S	60
Frisbie Aircraft Products Co	60
Haskelite Mfg. Co	60
Husband Aircraft Specialties	60
Ludington Philadelphia Flying Service, Inc.	60
New England Airways, Inc.	60
New Hamco Air Service	60
Parsons, Jonett Y.	60
Pioneer Instrument Co	60
Polachek, J. H.	60
Rieker Instrument Co.	60
Sparkplug Renewal Service	60
Stern & Co., Chas.	60
Sweetbrock Aviation Co	60
Weis, Inc., Geo. A.	60
Westchester Airport Corp.	60

Professional Services

Aeronautical Research Laboratory	62
B & B Construction Co.	62
Gazley & Lasha	62
Lancaster & Allwine	62
Youngberg, Brown & Youngberg	62

Where to Fly

Page	61

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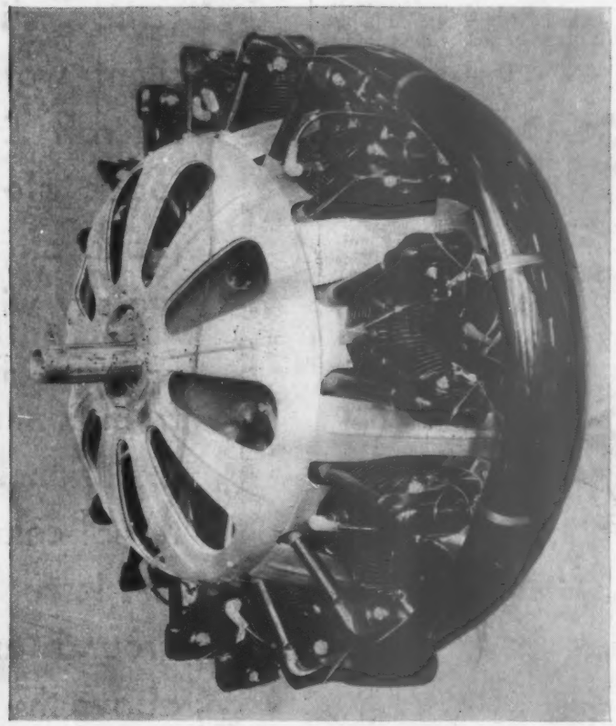

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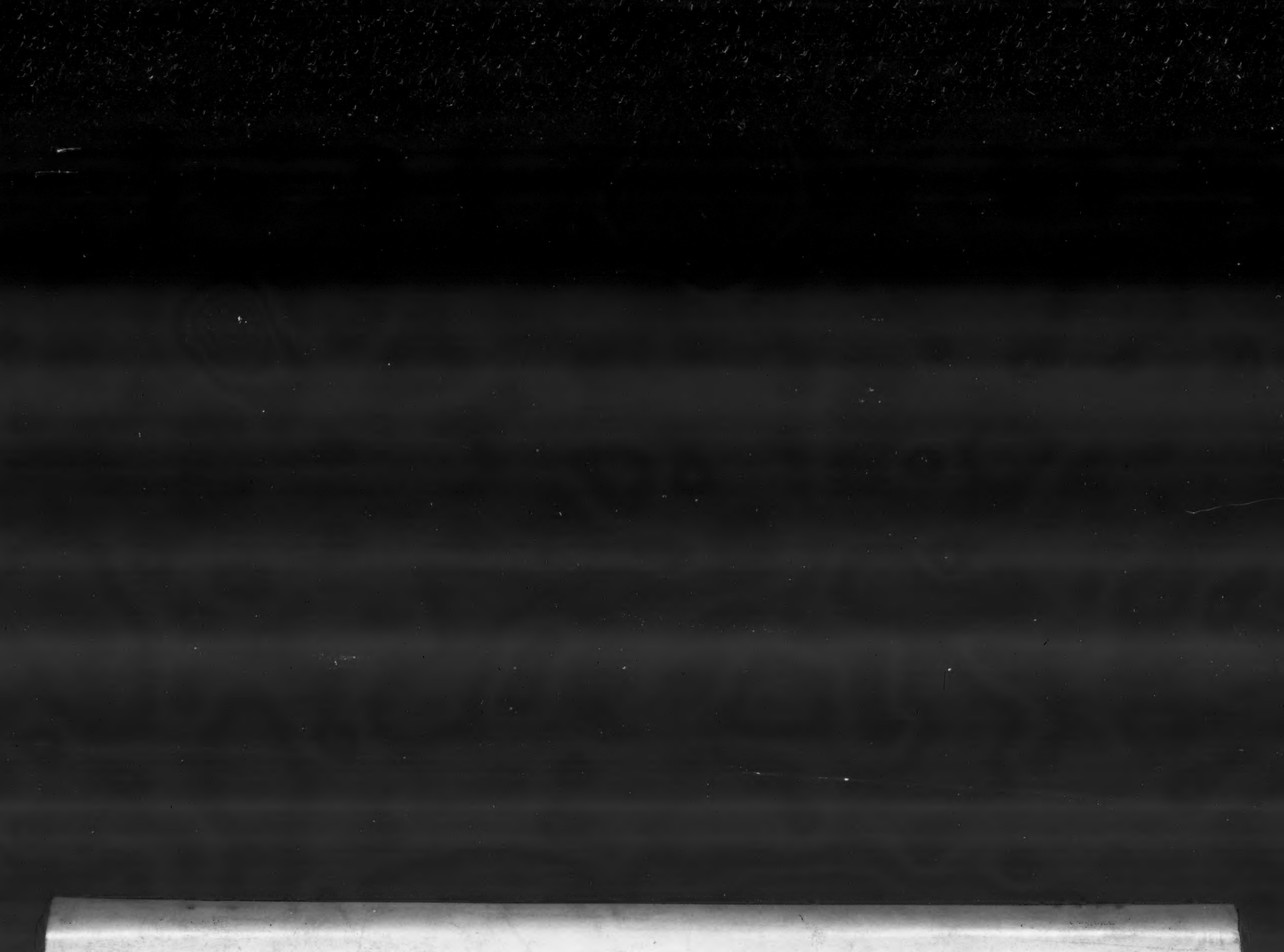
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